

























# LIST OF COPIES OF PATENTS ISSUED IN 1914.

relating to the GRAPHOPHONE ART.

223  
P5066  
1878  
V.14  
N.M.H.

1,084,319,	Jan. 13,	Dennison,	Sound Box for Talking Machines.
1,084,415,	Jan. 13,	Emerson,	Sound Record and Production thereof.
1,084,570,	Jan. 13,	Burchett,	Clarifying attachment for Talk. Mach.,
10,84,571,	Jan. 13,	Claussen,	Talking Machines,
1,084,572,	Jan. 13,	"	Talking Machine,
1,084,573,	Jan. 13,	"	Talking Machine,
1,085,354,	Jan. 27,	Mukautz,	Sound Box,
1,085,848,	Feb. 3,	Catucci,	Phonograph Sound Box,
1,085,849,	Feb. 3,	"	Phonograph,
1,087,035,	Feb. 10,	Miller,	Sound Box,
1,087,106,	Feb. 17,	Catucci,	Phonograph,
1,087,256,	Feb. 17,	Pumphrey,	Talking Machine,
1,087,339,	Feb. 17,	Weber,	Sound Box,
1,087,493,	Feb. 17,	Holland,	Talking Machine Attachment,
1,089,835,	Mar. 10,	Gregory,	Phonograph Record,
1,091,001,	Mar. 24,	Macdonald,	Sound Box,
1,091,202,	Mar. 24,	English,	Sound Box Diaphragm,
1,092,552,	Apr. 7,	Zackey,	Sound Box,
1,092,911,	Apr. 14,	Holland,	Phonograph,
1,093,611,	Apr. 21,	Friedlander,	Talking Machine,
1,093,710,	Apr. 21,	Macdonald,	Sound Box and Mounting Therefor,
1,093,732,	Apr. 21,	Scully,	Combined Recorder and Reproducer,
1,094,067,	Apr. 21,	Green,	Talking Machine,
1,094,166,	Apr. 21,	Peltovitz,	Tone Arm for Talking Machines,
1,094,476,	Apr. 28,	Roever,	Record Holder,
1,095,195,	May 5,	Dayan,	Attachment for Sound Reproducing Instruments.
1,095,225,	May 5,	Norton,	Talking Machine.
1,095,747,	May 5,	Di Stanislao,	Talking Machine.
1,096,661,	May 12,	Woods,	Reproducer for Talking Machines.
1,097,499,	May 19,	Young,	Method of Making Acoustic Diaphragms.
1,097,618,	May 26,	Fischer,	Flexible Joint for the Tone Arms of Talking Machines.
1,097,771,	May 26,	Rotter,	Phonographic Doll.
1,097,972,	May 26,	Gall,	Phonograph Reproducer.
1,097,987,	May 26,	Osborne,	Phonograph.
1,097,989,	May 26,	Pierman,	Phonograph.
1,098,313,	May 26,	Catucci,	Horn Support.
1,098,340,	May 26,	Weber,	Diaphragm for Phonograph Sound Boxes.
1,099,346,	June 9,	Edison,	Phonograph Reproducer.
1,099,347,	June 9,	Edison,	Phonograph Reproducer.
1,099,348,	June 9,	Edison,	Phonograph Reproducer.
1,099,353,	June 9,	Fuhri,	Cabineted Graphophone.
1,099,458,	June 9,	Mauzer,	Graphophone and Talking Machine.
1,099,913,	June 16,	Brogan,	Talking Machine.
1,099,928,	June 16,	Macdonald,	Talking Machine.
1,100,107,	June 16,	Weser,	Graphophone.
1,100,024,	June 16,	Macdonald,	Dictation Graphophone.
1,100,401,	June 16,	Shaffer,	Cabinet for Phonograph Records.





1,100,107.	June 10.	Wiser.	Graphophone.
1,100,755,	June 23,	Macdonald,	Dictaphone.
1,100,849,	June 23,	Soistmann,	Phonograph Horn.
1,100,910,	June 23,	Price et al.	Needle Changing Device.
1,101,326,	June 23,	De Pezzer,	Indicating Device for Phonography and its application.
1,101,827,	June 30,	Aylsworth,	Process of Making Duplicate Phonograph Records.
1,101,906,	June 30,	Clay,	Method of Recording and Reproducing Sound.
1,102,073,	June 30,	Pearson,	Graphophone Record Cleaner.
1,102,090,	June 30,	Sheble,	Sound Box for Talking Machines.
1,102,253,	July 7,	Emerson et al.	Composite Disk Sound Record.
1,102,260,	July 7,	Gaydon,	Sound Producing Device.
1,102,290,	July 7,	Paddack,	Reproducer for Phonographs.
1,102,291,	July 7,	Paddack,	Sound Producing Diaphragm.
1,102,839,	July 7,	Wieder,	Sound Reproducing and Recording Instrument.
1,103,592,	July 14,	Lehr,	Stylus for Sound Reproducing Machines.
1,103,829,	July 14,	Possons,	Gramophone Needle or Stylus.
1,104,182,	July 21,	Funnell,	Sound Box.
1,104,340,	July 21,	Bliss,	Phonograph Sounding Board.
1,104,760,	July 28,	Abraham,	Repeating Device for Disc Talking Machines.
1,104,833,	July 28,	Schmittinger,	Diaphragm for the Sound Boxes of Talking Machines.
1,104,935,	July 28,	Ruppel,	Talking Machine.
1,106,269,	Aug. 4,	Woods,	Talking Machine.
1,106,443,	Aug. 11,	Durand	Controlling Device
1,106,448,	Aug. 11,	Holland	Phonograph.
1,106,516,	Aug. 11,	Lachman	Art of Stretching Sheet Metal
1,107,242,	Aug. 11,	Abraham	Repeating Mechanism.
1,107,451,	Aug. 18,	Yerkes	Coupling for Listening Tubes
1,107,506,	Aug. 18,	Emerson	Sound Record
1,107,597,	Aug. 18,	English,	Talking Machine
1,108,208,	Aug. 25,	Miller,	Phonograph
1,108,301,	Aug. 25, 1914,	Woods,	Talking Machine
1,108,302,	Aug. 25, 1914,	Woods,	Tone Arm for Talking Machines
1,108,451,	Aug. 25,	Little,	Sound Reproducing Machine
1,109,386,	Sept. 1,	Borresen,	Cabinet for Sound Reproducing Machines.
1,109,684,	Sept. 8,	Maillard et al.,	Signal,
1,110,165,	Sept. 8,	Trundy,	Phonograph,
1,110,382,	Sept. 15,	Edison,	Sound Modifier.
1,111,190,	Sept. 22,	Stahl,	Burglar Alarm,
1,111,716,	Sept. 22,	Markle,	Sound Reproducing Machine,
1,111,779,	Sept. 29,	Van Mater,	Phonographic Sound Box,
1,111,999,	Sept. 29,	Edison,	Phonograph Record,
1,112,406,	Sept. 29,	Ebeling,	Stylus Guiding Attachment for Sound Record,
1,112,407,	Sept. 29,	Ebeling,	Stylus Guiding Attachment for Sound Records.
1,112,838,	Oct. 6,	Rogers,	Stylus Guiding Attachment for Sound Records.
1,113,911,	Oct. 13,	Roethe,	Graphophone and Gramophone Sound Box,
1,113,973,	Oct. 20,	Emerson,	Disk Sound Record,
1,114,010,	Oct. 20,	Macdonald,	Metal Sound Record,
1,114,492,	Oct. 20,	Leissing,	Phonograph Attachment,
1,114,493,	Oct. 20,	Levin,	Stylus.
☆ #1,104,484,	July 21,	Gerster.	Automatic Stop for Sound Reproducing Machines.





1,115,374,	Oct. 27,	1914,	Aylsworth,	Sound Box;
1,115,707,	Nov. 3,	1914,	Marcus,	Disk Talking Machine;
1,116,165,	Nov. 3,	1914,	Thomas,	Diaphragm for Sound Reproducers;
1,116,166,	Nov. 3,	1914,	Thomas,	Diaphragm for Sound Reproducers;
1,117,143,	Nov. 10,	1914,	Abraham,	Repeating Device for Talking Machine;
1,118,345,	Nov. 24,	1914,	Hess,	Sound Box for Talking Machines;
1,118,348,	Nov. 24,	1914,	Johnson,	Sound Box;
1,118,647,	Nov. 24,	1914,	Gibson,	Sound Box for Reproducing and Recording Sound Waves;
1,118,653,	Nov. 24,	1914,	Jones,	Sound Box for Talking Machines;
1,118,675,	Nov. 24,	1914,	Owen et al.	Diaphragm;
1,118,902,	Nov. 24,	1914,	Hibbard,	Talking Machine;
1,119,064,	Dec. 1,	1914,	Capps,	Mandrel for Sound Records;
1,119,065,	Dec. 1,	1914,	Capps,	Ejector Mechanism for Cylindrical Re- cords;
1,119,113,	Dec. 1,	1914,	Pierman,	Phonograph Reproducer;
1,119,141,	Dec. 1,	1914,	Edison,	Sound Reproducer;
1,119,142,	Dec. 1,	1914,	Edison,	Sound Record;
1,119,157,	Dec. 1,	1914,	Hibbard,	Phonograph;
1,119,269,	Dec. 1,	1914,	Gall,	Phonograph;
1,119,920,	Dec. 8,	1914,	Woods,	Sound Box;
1,120,141,	Dec. 8,	1914,	Fischer,	Stylus Holder for Graphophones and Like Instruments;
1,120,841,	Dec. 15,	1914,	Norris,	Sound Reproducing Apparatus,
1,121,139,	Dec. 15,	1914,	Schoonmaker,	Attachment for Talking Machines;
1,122,679,	Dec. 29,	1914,	Borzsony,	Talking Machine Cabinets,
1,121,887,	Dec. 22,	1914,	Woods,	Speed Governor for Talking Machines.





VOLUME XIV.

GRAPHOPHONE PATENTS.

1,084,319 - 1,122,679.

January 13, 1914 - December 29, 1914.

---

Abraham, L.	1,104,760
" "	1,107,242
" "	1,117,143
Aylsworth, J.W.	1,101,827
" "	1,115,374

Bliss, D.M.	1,104,340
Borresen, H.A.	1,109,386
Borzsony, A.	1,122,679
Brogan, G.W.	1,099,913
Burchett, W.J.	1,084,570

Catucci, P.	1,085,848
" "	1,085,849
" "	1,087,106
" "	1,098,313
Capps, F.L.	1,119,064
" "	1,119,065
Claussen, M.B.	1,084,571
" "	1,084,572
" "	1,084,573
Crook & Maillard,	1,109,684
Clay, F.W.H.	1,101,906

Dayan, S.	1,095,195
Dennison, W.N.	1,084,319
DePezzer, M.	1,101,326
Durand, N.C.	1,106,443





Ebling, T.A.	1,112,406
" " "	1,112,407
Edison, T.A.	1,099,346
" " "	1,099,347
" " "	1,099,348
" " "	1,110,382
" " "	1,111,999,
" " "	1,119,141
" " "	1,119,142
Emerson, V.H.	1,084,415
" " "	1,107,502
" " "	1,113,973
Emerson, Manwaring & Reynard,	1,102,253
English, J.C.	1,091,202
" " "	1,107,597

Fischer, A.	1,097,618
Fischer, M.H.	1,120,141
Friedlander, E.A.	1,093,611
Fuhri, W.C.	1,099,353
Funnell, G.L.	1,104,132

Gall, A.F.	1,097,972
" " "	1,119,269
Gaydon, H.A.	1,102,260
Gibson, R.L.	1,118,647
Green, J.	1,094,067
Gregory, F.H.	1,089,835
<i>Gester, W.V.</i>	<i>1,104,489</i>

Hess, H.W.	1,118,345
Hewitt & Owen,	1,118,675
Hibbard, C.L.	1,118,902
" " "	1,119,157
Holland, N.H.	1,092,911
" " "	1,106,448
Holland, W.C.	1,087,493

Johnson, E.R.	1,118,348
Jones, A.D.	1,118,653





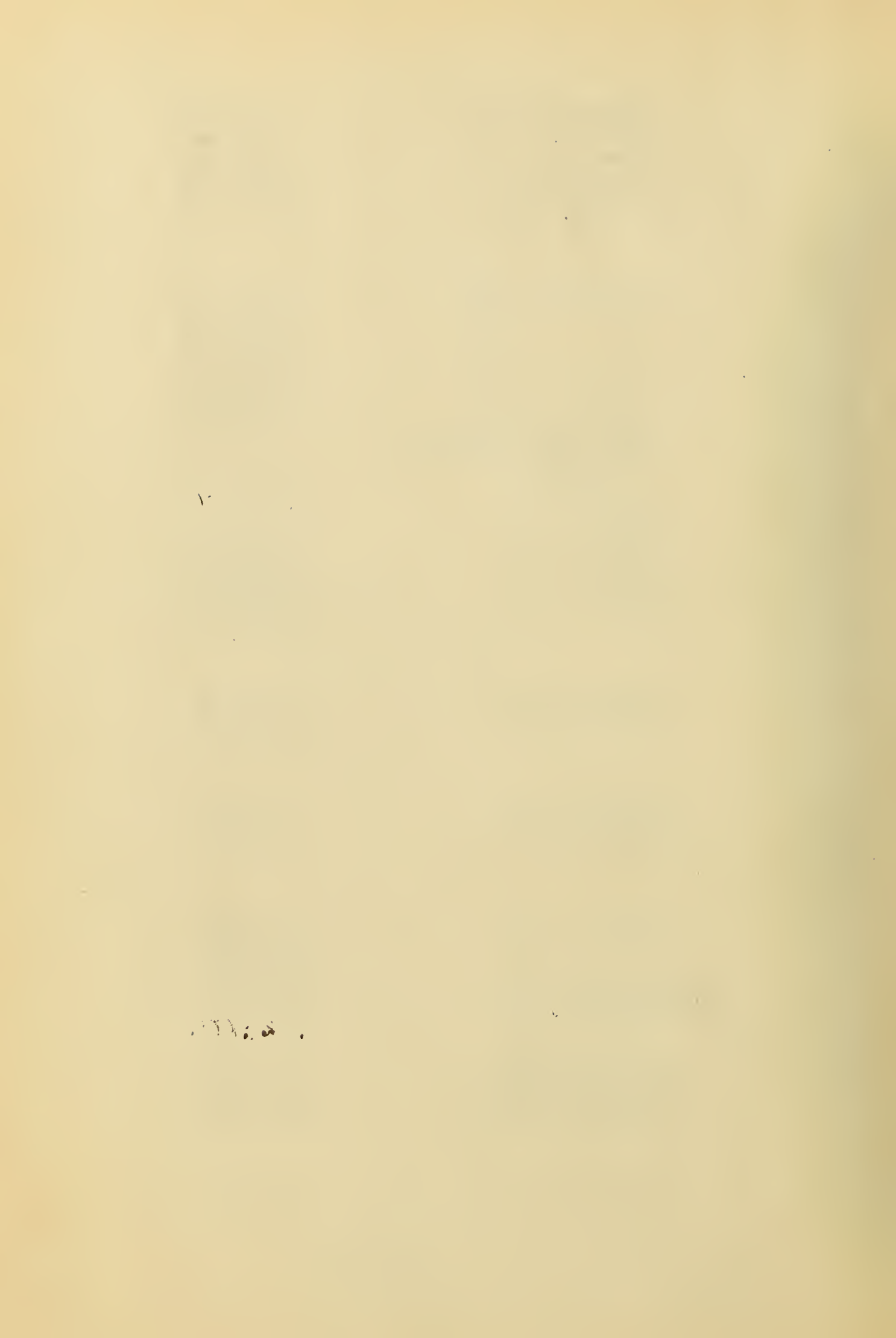
Lachmann, L.S.	1,106,516
Lehr, G.	1,103,592
Leissing, A.H.	1,114,492
Levin, S.	1,114,493
Little, A.B.	1,108,451

Macdonald, T.H.	1,091,001
" " "	1,093,710
" " "	1,099,928
" " "	1,100,024
" " "	1,100,755
" " "	1,114,010
Maillard & Crook,	1,109,684
Manwaring, Emerson & Reynard,	1,102,253
Marcus, M.	1,115,707
Markle, H.E.	1,111,716
Maurer, K.A.	1,099,453
Miller, H.C.	1,087,035
Miller, W.H.	1,108,208
Mukautz, P.J.	1,085,354

Norris, G.F.	1,120,841
Norton, E.E.	1,095,225

Osborne, C.S.	1,097,987
Owen & Hewitt,	1,118,675

Paddack, S.D.	1,102,290
" " "	1,102,291
Pearson, W.G.	1,102,073
Peltovitz, E.	1,094,166
Pierman, A.N.	1,097,989
" " "	1,119,113
Possons, M.A.	1,103,829
Price & Wheeldon,	1,100,910
Pumphrey, H.W.	1,087,256



Reynard, Emerson &	
Manwaring,	1,102,253
Roether, A.L.	1,113,911
Roever, J.	1,094,476
Rogers, H.W.	1,112,838
Rotter & Arthur	1,097,771
Ruppel, C.	1,104,935

Schmittinger, J.	1,104,833
Schoonmaker, H.W.	1,121,139
Scully, J.J.	1,093,732
Sheble, H.	1,102,090
Soistman, A.G.	1,100,849
Stahl, A.	1,111,190
Stanslao, G.	1,095,747
<i>Shaffer, E.B.</i>	<i>1,100,401</i>

Thomas, F.W.	1,116,165
" "	1,116,166
Trundy, C.P.	1,110,165

VanMater, J.H.	1,111,779
----------------	-----------

Weber, P.	1,087,339
" "	1,098,340
Weser, J.A.	1,100,107
Wieder, H.G.	1,102,839
Wheeldon & Price,	1,100,910
Woods, C.E.	1,096,661
" "	1,106,269
" "	1,108,301
" "	1,108,302
" "	1,119,920
" "	1,121,887

Yerkes, H.A.	1,107,471
Young, W.W.	1,097,499

Zackey, W.W.	1,092,552
--------------	-----------





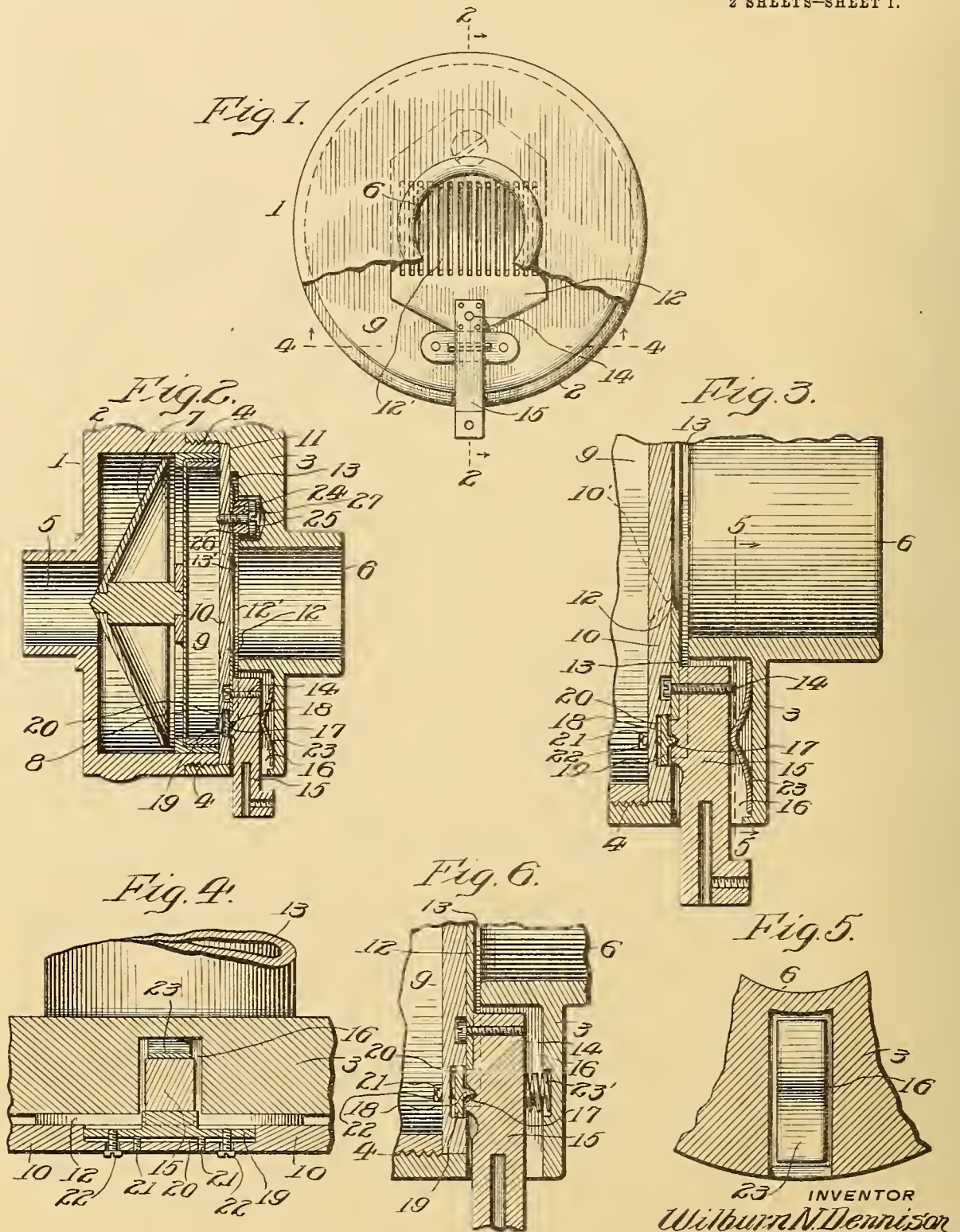


W. N. DENNISON.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED FEB. 1, 1907.

1,084,319.

Patented Jan. 13, 1914.

2 SHEETS—SHEET 1.



WITNESSES  
*W. G. Hartman.*  
*Alfred J. Moulton*

BY

*Wm. L. L.*

ATTORNEY



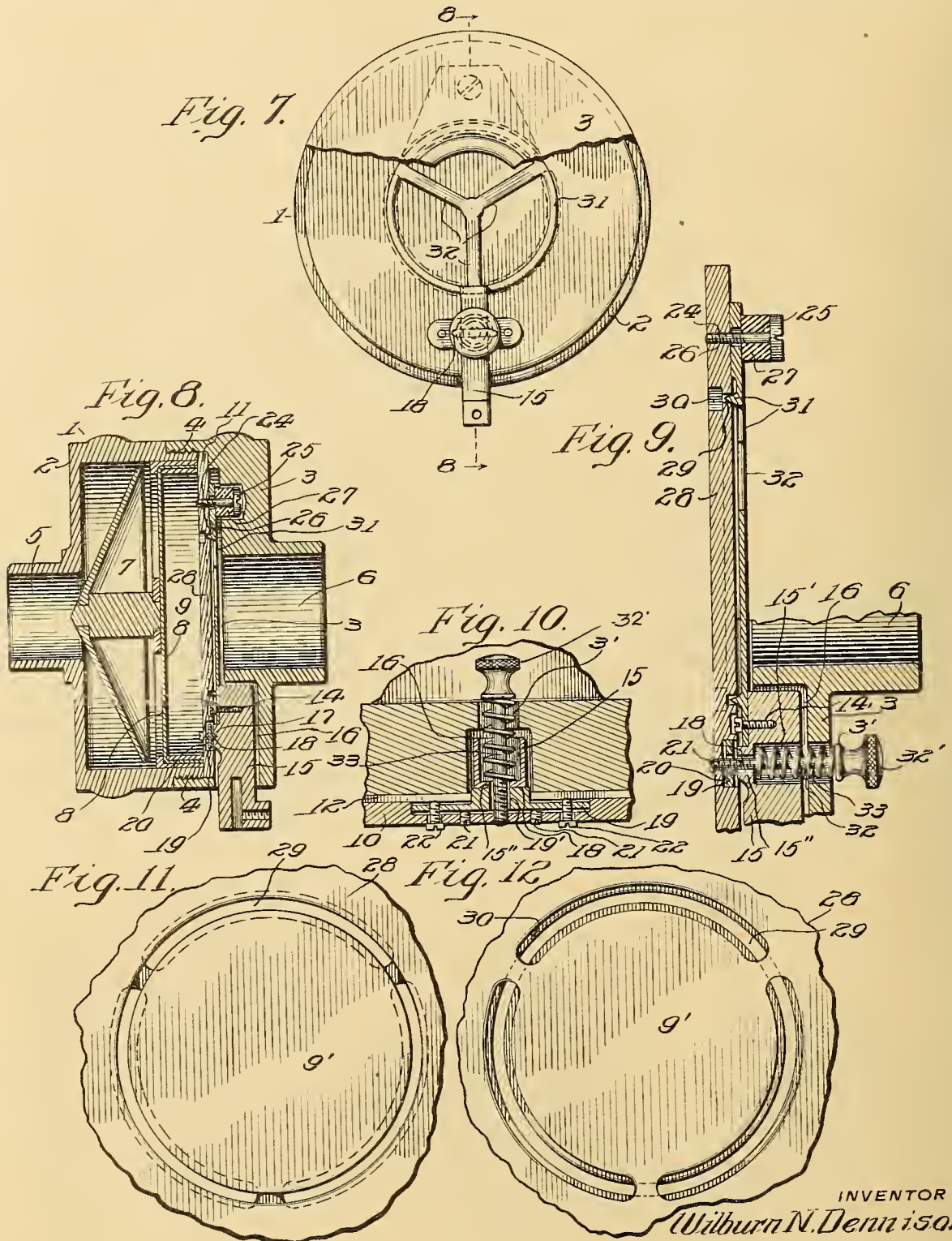


W. N. DENNISON.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED FEB. 1, 1907.

1,084,319.

Patented Jan. 13, 1914.

2 SHEETS—SHEET 2.



INVENTOR

Wilburn N. Dennison.

WITNESSES

*W. J. Hartman.*

*Albert B. Moulton.*

BY

*1 June 1914.*

ATTORNEY



# UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-BOX FOR TALKING-MACHINES.

1,084,319.

Specification of Letters Patent.

Patented Jan. 13, 1914.

Application filed February 1, 1907. Serial No. 355,217.

*To all whom it may concern:*

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, county of Camden, State of New Jersey, have invented certain new Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming part of this specification.

This invention relates in general to sound boxes, but more particularly to pneumatic sound boxes for talking machines and includes improvements in that form of pneumatic sound box in which a valve is provided, the movable member of which is positioned within and very close to the sound box casing so that the air passing through the valve is caught or trapped between the movable member and the casing to cushion or balance the movable member.

The main objects of this invention are: to provide in a pneumatic sound box a valve having a movable member of delicate construction which will respond readily to the vibrations of the stylus bar and which will be cushioned or balanced by the air passing through the valve; to provide an improved mounting for the stylus bar and the movable member of the valve, whereby the valve may be adjusted with great accuracy and whereby the balancing effect of the air after it has passed through the valve will not be impaired; to provide adjustable means for holding and tensioning the movable member upon its mounting; to provide an improved form of opening through the valve to permit the air to pass freely therethrough; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary front end view of a sound box constructed in accordance with this invention; Fig. 2 a longitudinal section on line 2—2 of Fig. 1; Fig. 3 an enlargement of a portion of Fig. 2; Fig. 4 an enlarged fragmentary sectional view on line 4—4 of Fig. 1; Fig. 5 a fragmentary sectional view on line 5—5 of Fig. 3; Fig. 6 a fragmentary sectional view corresponding to Fig. 3 showing a modification of the invention; Fig. 7 a view corresponding to Fig. 1 of a modified form of this invention; Fig. 8 a longitudinal sectional view taken on line 8—8

of Fig. 7, parts thereof being omitted; Fig. 9 an enlarged fragmentary longitudinal central sectional view of the sound box shown in Figs. 7 and 8; Fig. 10 a transverse sectional view of the sound box shown in Fig. 9; and Figs. 11 and 12 are enlarged fragmentary front and rear elevations respectively of the valve seat shown in Figs. 7 to 9.

Referring to the drawings, one form of this invention comprises a sound box 1 having a casing 2 and a cap or cover 3 secured to the casing in any suitable manner, as by screw threads 4. The casing is provided with an inlet 5 through which air is forced by any suitable mechanism and is also provided with an outlet 6 adapted to be connected to the usual sound conveying tube through which the air, having impressed upon it undulations corresponding to sound waves, passes to the usual sound amplifier.

Within the casing is mounted a deflector 7 and a reticulated diaphragm 8 by means of which the air entering the sound box is first deflected to the side walls of the sound box and is then diffused equally throughout the chamber 9 immediately back of the valve.

The valve is secured to the inside of the sound box in any suitable manner, for instance by having the edges of the stationary member or valve seat 10 clamped on the seat 11 between the casing 2 and the cap 3. The inner face of the cap 3 is recessed to form a shallow chamber 13 between the stationary valve member 10 and the inside wall of the cap, the movable valve member 12 being mounted within said shallow chamber 13.

In the form of the invention illustrated in Figs. 1 to 5 inclusive, the valve seat 10 is provided with a series of narrow parallel straight openings or ports 10' and the movable valve member is also provided with a similar series of openings 12', the two parts being so adjusted that the bars so formed between the openings in the said movable member overlap and close the said openings in the stationary member when the movable member rests squarely against the stationary member, as shown in Figs. 1 and 3.

The series of parallel openings in the valve members make a grid-like construction, which is wider than the opening 6 in the cap 3, to permit a considerable portion of the air passing the valve to be dis-



charged directly into the shallow chamber 13 in the face of the cap 3. The air so discharged into the chamber 13 can pass out of the same only through the constricted opening 13' between the movable valve member 12 and the rear wall of said chamber and in so passing forms a cushion which balances the movable valve member 12 and renders the same very sensitive to the vibrations of the stylus bar. The slightest variation in the record groove will then be accurately imparted to the movable member of the valve greatly improving the quality of the reproduction.

The movable member 12 of the valve is secured to and carried by the stylus bar 15, the lower portion of the movable member being secured to the upper end of the bar in any suitable manner as by a screw 14. This stylus bar is reduced to the smallest dimensions consistent with rigidity and fits closely in a recess 16 provided therefor in the inner wall of the cap 3, the recess communicating with the cushioning chamber 13, and also opening outwardly through the side of the cover 3. The stylus bar projects outwardly from the casing and is provided at its outer end with the usual socket for holding the stylus.

The space between the stylus bar and the walls of the recess 16 is only sufficient to permit the necessary adjustment and free oscillation of the bar, so that the size of the cushioning chamber 13 is not materially increased by the free space in the recess 16, and so that any considerable amount of air is prevented from passing from the balancing chamber through the recess and out through the side of the sound box.

For mounting the stylus bar, the side of the bar adjacent the valve seat is provided with a transverse substantially V-shaped groove 17 in which is seated a knife edge 18 of a length substantially equal to the width of the bar. This knife edge is integral with a plate 19 of somewhat greater dimensions in length and width than the corresponding dimensions of the knife edge to provide a rigid base for the knife edge. The plate 19 rests against push screws 21, which are threaded through the valve seat 10 from the back thereof and the plate is held in position against these screws by the headed screws 22 which extend freely through the valve seat 10 from the back thereof and are threaded into the plate 19. By adjusting these screws 21 and 22, the knife edge may be adjusted to such a distance from the face of the valve seat 10 that the movable valve member 12 will rest normally squarely against the valve seat 10. The stylus bar is forced against the knife edge 18 by means of a spring 23 situated between the front side of the stylus bar and the adjacent wall of its recess, as shown in Figs. 3 and 4.

For yieldingly restraining the oscillation of the movable member of the valve, the member 12 is provided adjacent its upper or free end with an aperture 24, through which loosely extends the screw 25, which is threaded into the valve seat 10. The back wall of the shallow cushioning chamber 13 is recessed as at 26 to receive the head of the screw 25 and this recess is substantially filled by an elastic washer 27 mounted on the screw between the head of the screw and movable member of the valve, as shown in Fig. 2. The purpose of the screw 25 and washer 27 is to prevent the movable valve member 12 from being forced too far from its seat, should the pressure of the air within the sound box become greater than usual for any reason.

In Fig. 6 is shown a form of the invention in which a coiled or spiral spring 23' is substituted for the leaf or buckled spring 23, illustrated in the previously described construction. This spring is arranged so that it acts in the direction of the knife edge bearing 18 to hold the stylus bar firmly upon the same without exerting any substantial resistance to the free oscillation of the stylus bar.

From the above it will be apparent that the movable valve member is carried by a stylus bar which is mounted upon a knife edge bearing which occupies but a very little space and is so arranged as not to interfere with the effect of the pneumatic balance or cushioning chamber, and further, that this bearing may be easily adjusted so as to cause the movable member to rest normally squarely upon the stationary valve member without tension or tendency to bend or buckle.

In Figs. 7 to 12 inclusively is shown an embodiment of this invention in which the valve is annular instead of grid-like. In this form the stationary valve member 28 is provided on one side with a narrow circular groove 29, the depth of which is substantially half the thickness of the said stationary member, and on its opposite side the same is provided with a series of circular slots 30, which are a little wider than the width of the groove 29 and are cut through until they communicate with the groove 29. Between the slots 30, the material of the stationary valve member 28 forms a connection between the central portion of the stationary member of the valve and the outer portion thereof. The movable member of this modified form of valve, shown in Figs. 7 to 12 is in the form of a ring 31. The face of this ring is beveled and tapered toward the valve seat to form an annular rib substantially triangular in cross section, the apex of which is adapted to rest within the groove or annular valve port 29, to close the same when the movable member is in



its normal position upon its seat. This ring 31 is provided with radial arms 32 to stiffen the same, thus making of the movable member a spider-like structure. The movable member is secured to the stylus bar by screws 14 or in any other suitable manner, as in the construction previously described. This annular movable valve member can be made extremely light, and somewhat flexible, and yet be sufficiently rigid to perform its function, and the construction of the valve is such that all of the air passing through the valve is admitted directly into the compression chamber to balance or cushion the movable member before passing outwardly through the opening 6 of the sound box to the amplifying horn, or other sound augmentative device.

Instead of employing a spring such as previously described for holding the stylus bar against its knife edge mounting, the stylus bar may be provided with a spring for this purpose, such as is shown in Figs. 9 and 10 which is adjustable from without the sound box casing to exert various pressures upon the stylus bar to meet various conditions. In this adjustable form of means for holding the stylus bar upon its mounting, the stylus bar 15 is provided with a chamber 15', and the cover 3 of the sound box casing with an opening 3' in axial alinement with the chamber of the stylus bar. At the bottom of the chamber 15' in the bar is a concentric opening 15'', and through the plate 19 is another opening 19', also in axial alinement with the chamber 15'. A screw 32 passes loosely from the outside of the sound box casing through the openings 3', 15', 15'' and 19', through the casing, the stylus bar, and adjustable supporting plate, and is threaded into the fixed valve seat 28, the outer end of the screw being provided with a knurled head 32' projecting outside of the casing. Surrounding the screw 32 between the head thereof and the bottom of the chamber 15' of the stylus bar is a spiral spring 33 and by turning the screw 32 from the outside of the casing, the pressure of the spiral spring 33 against the stylus bar may be varied to hold the bar with more or less force against the knife edges 18. The longitudinal axis of the screw 32 and the spiral spring 33 normally intersects the axis of oscillation of the movable member of the valve and is substantially perpendicular to the face of the valve seat.

In the operation of either of the forms of this invention above described, the movable member of the valve will be slightly lifted from its seat by the ordinary pressure of the air passing through the sound box and the movable member will be vibrated and slightly flexed by the stylus bar which is caused to vibrate in a well known manner by means of a suitable sound record, and

sound waves corresponding to the undulations of the record will be impressed upon the air passing through the sound box. With a substantially uniform pressure of air in the sound box in the chamber back of the valve seat, the tensioning screw 25 and the elastic washer 27 might be dispensed with, but since the pressure of air back of the valve generally varies and may be greater than is absolutely necessary for the operation of the device, the screw and elastic washer are generally serviceable in preventing the movable member of the valve from being forced from its seat.

Although this invention has been described as embodied in a pneumatic sound box, it is obvious that some of the features of the invention might be used in other forms of sound boxes or in other devices, for instance the improved mounting for the stylus bar might be used in connection with any well known form of sound box having a diaphragm instead of a valve. Therefore when the term sound box is used it is intended to cover any form of sound reproducing means to which this invention might be applied. Moreover this improved mounting of the bar might be applied directly to the movable member of the valve and it is desired that the appended claims should be interpreted to cover either a mounting for a valve or a mounting for a stylus bar, or for any other movable member. Furthermore, although only two of the forms in which this invention may be embodied are described herein, the invention is not intended to be limited to either of these forms, as many changes might be made in the constructions set forth without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described the invention, I claim and desire to protect by Letters Patent of the United States:

1. In a sound box for talking machines, the combination with the casing of a valve consisting of a stationary and a movable member, said valve being located adjacent the wall of said casing, said casing being recessed to form a shallow balancing chamber in which said movable member is located, a stylus bar connected to said movable member and a knife edge bearing upon which said stylus bar is mounted.

2. In a sound box for talking machines, a stationary valve member, knife edge bearings adjustably mounted on said stationary member, a stylus bar, a movable valve member carried by said stylus bar, and yielding means arranged centrally of said bearings to hold said stylus bar on said knife edges.

3. In a sound box for talking machines, a stationary valve member, a movable valve member, knife edge bearings on said stationary member, a stylus bar attached to said



movable member and means arranged centrally of said bearings for holding the said stylus bar on said knife edges.

4. In a sound box for talking machines, a recessed casing, a stylus bar substantially filling said recess, a stationary valve member, a movable valve member mounted on said stylus bar, knife edge bearings on which said stylus bar is mounted, and means extending through one side of said casing for holding said stylus bar on said knife edges.

5. In a sound box for talking machines, a stationary valve member provided with a recess, a plate having knife edges adjustably mounted in said recess, a stylus bar provided with a groove for engagement with said knife edges, and a spring acting toward the longitudinal axis of said bar for holding said stylus bar in engagement with said knife edges.

6. In a sound box for talking machines, a movable valve member consisting of a flexible ring having a beveled face, and a stationary valve member having an annular opening adapted to be opened and closed by said flexible ring.

7. In a sound box for talking machines, the combination with a movable valve member and a stylus bar attached thereto, of a casing the side of which adjacent said movable member is provided with a recess forming a chamber between said movable member and said casing, said chamber being provided with a depressed portion which the top of said stylus bar substantially fills.

8. A sound box for talking machines, comprising a casing having an opening adapted to be connected to the sound conveying tube of a talking machine, said casing being provided with a chamber around said opening, a valve mounted in said chamber whereby all of the air passing through said valve first enters said chamber before passing out of said opening.

9. In a sound box for talking machines, the combination with a stationary valve member having an annular opening there-through, of a movable valve member having a projecting ring adapted to operate with said annular opening, and a stylus bar attached to said movable member.

10. In a sound box for talking machines, the combination of a stylus bar, a movable valve member mounted on said stylus bar, knife edge bearings on which said stylus bar is mounted, a casing inclosing said parts, and means accessible from without said casing for varying the pressure of the stylus bar upon said bearings.

11. In a sound box for talking machines, the combination of a stylus bar, a movable valve member mounted on said stylus bar, knife edge bearings on which said stylus bar is mounted, a casing inclosing said parts and adjustable means accessible from without

said casing for yieldingly retaining said stylus bar in operative engagement with said knife edges.

12. In a sound box for talking machines, the combination of a casing, a stationary valve seat, a movable valve member, a stylus bar on which said movable member is mounted, knife edges carried by said valve seat within said casing, a groove on said stylus bar for engagement with said knife edges, a headed screw passing loosely through said stylus bar and threaded into said valve seat and extending outside of said casing, and a spring interposed between the head of said screw and said stylus bar to hold said stylus bar upon said knife edges.

13. In a sound box for talking machines, a fixed member, a knife edge bearing carried thereby and movable toward and away from said fixed member, a stylus bar mounted on said bearing, and yielding means to hold said bar on said bearing.

14. In a sound box for talking machines, a fixed valve member having a substantially flat surface provided with a recess, a knife edge bearing adjustably mounted in said recess, a substantially flat movable valve member, and a stylus bar attached thereto mounted on said knife edge bearing, the inner side of said bar being substantially in the plane of the inner side of said movable valve member.

15. In a sound box for talking machines, the combination with a valve seat provided with an annular port of a member having an annular portion with a beveled face arranged to engage in said port.

16. In a sound box for talking machines, the combination with a valve seat having an annular port, of a flexible member having an annular portion projecting from said member toward said port and adapted to open and close said port.

17. In a sound box for talking machines, the combination with a valve seat having an annular port of a flexible member having an annular portion adapted to open and close said port, said flexible member being mounted at one side of said port to oscillate toward and away from the same and being restrained upon the opposite side of said member.

18. In a sound box for talking machines, the combination with a valve seat having an annular port of a flexible member having an annular portion adapted to open and close said port, said flexible member being mounted at one side of said port to oscillate toward and away from the same and being yieldingly restrained upon the opposite side of said member.

19. In a sound box for talking machines, the combination with a stylus bar of a bearing for said bar and means rigid with said bearing and extending loosely through said



bar intersecting the longitudinal axis thereof for holding said bar on its bearing.

20. In a sound box for talking machines, a stylus bar, a bearing for said bar, a projection secured to said bearing and extending loosely through said bar, intersecting the longitudinal axis thereof, and yielding means between said projection and said bar for holding said bar upon its bearing.

21. The combination with a valve seat provided with a recess in the face thereof, of a bearing adjustably mounted in said recess, and a movable member mounted to oscillate on said bearing.

22. The combination with a valve seat provided with a recess in the face thereof, of a bearing adjustably mounted in said recess, a movable valve member mounted to oscillate on said bearing, and means to hold said movable member upon said bearing.

23. The combination with a valve seat provided with a recess in the face thereof, of a bearing adjustably mounted in said recess, a movable member mounted to oscillate on said bearing, and yielding adjustable means to hold said movable member upon said bearing.

24. The combination with a valve seat having a recess in the face thereof, of a bearing adjustably mounted in said recess, a movable member mounted to oscillate on said bearing, and means connected to said seat and extending through said bearing and said movable member to hold said movable member on said bearing.

25. The combination with a valve seat provided with a recess, of a knife edge bearing adjustably mounted in said recess, a movable member mounted on said knife edge and yielding means for holding said movable member in engagement with said knife edge.

26. In a sound box for talking machines, a recessed casing, a stylus bar substantially filling said recess, a stationary valve member, a movable valve member mounted on said stylus bar, bearings on which said stylus bar is mounted, and means extending through one side of said casing for holding said stylus bar on said bearings.

27. The combination with a valve seat provided with a recess, of a bearing adjustably mounted in said recess, a stylus bar mounted to oscillate on said bearing, and means acting toward the longitudinal axis of said bar for holding said bar upon its bearing.

28. The combination with a valve seat, of a bearing carried thereby and movable toward and away from said seat, a movable member mounted to oscillate on said bearing, and means to hold said movable member on said bearing.

29. In a sound box for talking machines, the combination with a valve seat, of a bear-

ing carried thereby and adjustable toward and away from said seat, a movable member mounted to oscillate on said bearing, and yielding means to hold said movable member on said bearing.

30. In a sound box, the combination with a valve seat having an annular port, of a movable annular valve member mounted to oscillate adjacent said seat upon an axis adjustable toward and away from said seat.

31. In a sound box the combination with a valve seat having an annular port, of a movable annular valve member mounted to oscillate adjacent said seat upon an adjustable axis.

32. In an elastic fluid sound reproducing apparatus, the combination of a valve seat provided with ports, a knife edge, a valve adapted to turn on said knife edge, a spring to hold said valve to its seat and an adjusting screw for controlling the pressure on said spring, substantially as set forth.

33. A sound box provided with an annular port, and a flat movable valve arranged adjacent said port to control the flow there-through, and means to vibrate said valve in accordance with sound waves to impress sound waves upon a fluid passing through said port.

34. A sound box provided with a substantially annular port, and a movable substantially flat annular valve arranged adjacent said port to control the flow therethrough and means to vibrate said valve in accordance with sound waves.

35. In a sound box, the combination with a valve seat, of a bearing adjustable toward and away from said seat, a movable valve member mounted to oscillate on said bearing, and means to hold said valve member on said bearing.

36. In a sound box having a discharge opening, the combination with a flat valve seat in said sound box and provided with an annular port of greater diameter than that of said discharge opening, of a valve mounted on the discharge side of said valve and arranged to open and close said port, and means to actuate said valve in accordance with the sound waves.

37. In a sound box having a discharge opening, the combination with a valve mounted in said sound box and provided with an annular port of greater diameter than said discharge opening, of an annular valve mounted on the discharge side of said valve arranged to open and close said port, said valve being mounted in a chamber of larger diameter than the diameter of said discharge opening, and means to actuate said valve in accordance with sound waves.

38. In a sound box, the combination with a valve seat provided with an annular port, of a valve having a portion tapering in cross section toward said seat and arranged to en-

70

75

80

85

90

95

100

105

110

115

120

125

130

gage in said port, and means to vibrate said valve in accordance with sound waves to impress sound waves upon a fluid passing through said port.

5 39. In a sound box, the combination with a valve seat provided with an annular port, of an annular valve having a portion tapering in cross section toward said seat, said portion being arranged to engage in said  
10 port, and means to vibrate said valve in accordance with sound waves to impress sound waves upon a fluid passing through said port.

15 40. In a sound box, the combination with a valve seat provided with an annular port, of a valve having an annular portion tapering in cross section toward said seat and ar-

ranged to engage in said port, and means to vibrate said valve by and in accordance with a sound record.

20

41. In a sound box, the combination with a flat valve seat provided with an annular port, of a valve having an annular portion tapering in cross section toward said seat and arranged to engage in said port, and  
25 means to vibrate said valve in accordance with sound waves to impress sound waves upon a fluid passing through said port.

In witness whereof I have hereunto set my hand this 30th day of January, 1907.

30

WILBURN N. DENNISON.

Witnesses:

ALSTON B. MOULTON,  
ALEXANDER PARK.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

---

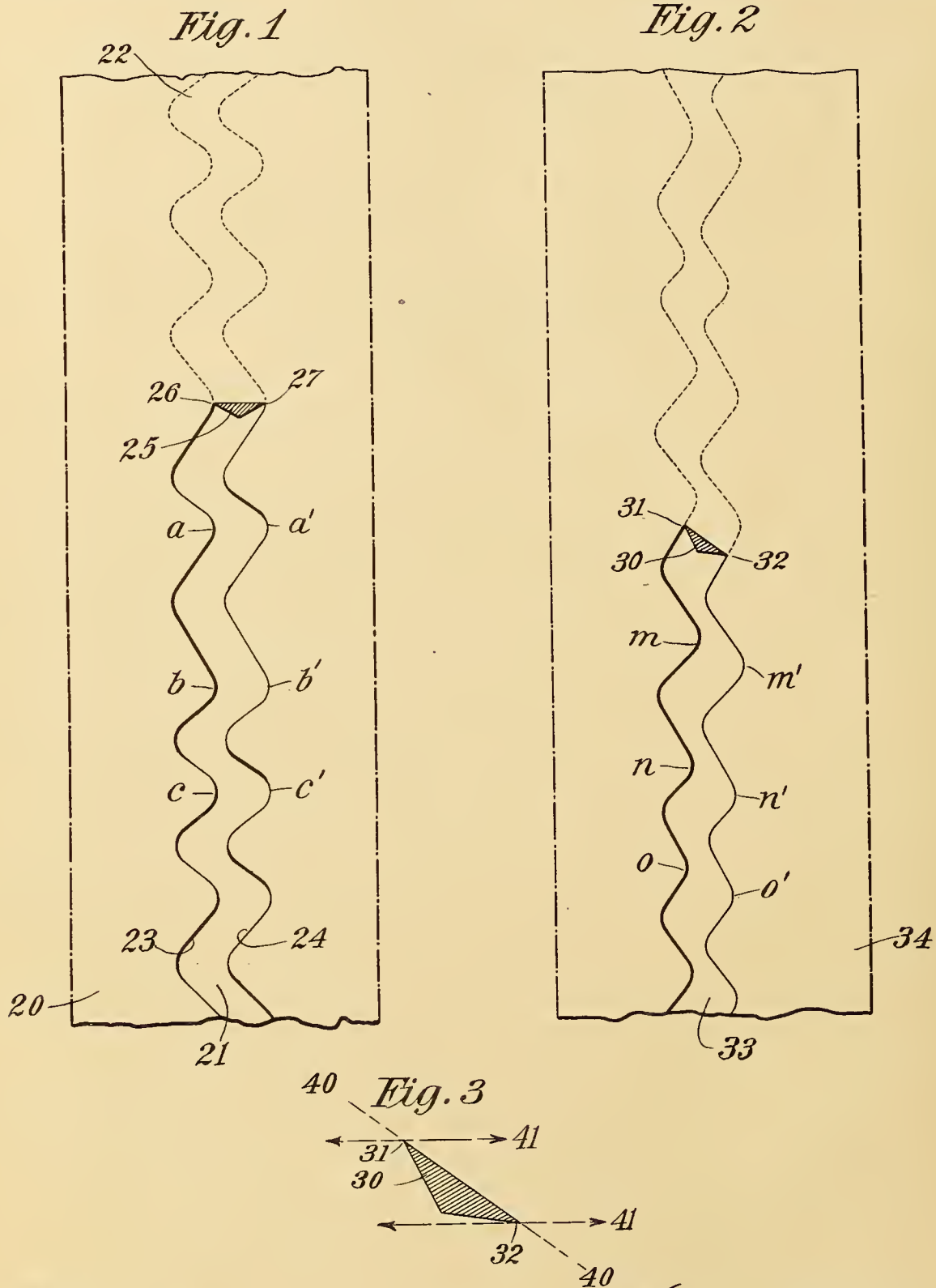




V. H. EMERSON.  
SOUND RECORD AND PRODUCTION THEREOF.  
APPLICATION FILED AUG. 2, 1912.

1,084,415.

Patented Jan. 13, 1914.



Witnesses:  
C. E. Warfield  
Jas H. Anderson

Victor H. Emerson, Inventor  
By his Attorneys  
Mauro, Cameron, Lewis & Massie

# UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-RECORD AND PRODUCTION THEREOF.

1,084,415.

Specification of Letters Patent.

Patented Jan. 13, 1914.

Application filed August 2, 1912. Serial No. 712,954.

*To all whom it may concern:*

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of the city, county, and State of New York, (whose post-office address is 102 West Thirty-eighth street, New York city, New York,) have invented a new and useful Improvement in Sound-Records and Production Thereof, which invention is fully set forth in the following specification.

My invention relates to sound-records having a laterally-undulating record-groove of substantially uniform depth, commonly known as "zigzag" records.

The object of the invention is to produce a record of this type which will have improved acoustical qualities. Such "zigzag" records are commonly manufactured as disks with the record-groove arranged spirally thereon, but they may also be made as cylinders carrying the record-groove in a helical line around the cylinder; yet, for convenience of consideration, such record-groove may be regarded as continuing in a straight line, with the lateral undulations on either side.

The underlying thought of my invention is to provide a (zigzag) record-groove of such character as to produce a duplication or immediate repetition of each impulse imparted to the reproducing-stylus, so that theoretically there should be expected a sort of "echo" as it were; yet in actual practice no echo will be observed by the listener, but merely increased fullness or roundness of tone. This duplication or repetition is accomplished by making the original record by means of a recording-stylus having its two oppositely-extending recording-edges disposed diagonally with respect to the direction of travel of the record-groove (instead of transversely thereof as heretofore). As the result of this arrangement one recording-edge is slightly advanced in front of the other, and each concavity produced in one side-wall of the record-groove will have its complementary (and simultaneously-produced) convexity located diagonally therefrom in the opposite wall of the groove (instead of directly across therefrom).

My invention, then, consists broadly in providing a diagonally-disposed pair of oppositely-facing recording-edges for making the original sound-groove; further, in the simultaneous production of diagonally-dis-

posed and complementary concavities and convexities corresponding to sound-waves; and also in a sound-record having such diagonal arrangement of its complementary concavities and convexities.

My invention will be best understood by reference to the annexed drawings, which are on a greatly exaggerated scale, to illustrate the same diagrammatically.

In these drawings: Figure 1 represents conventionally a plan of a portion of a flat record-tablet having an ordinary zigzag record-groove, and indicating in cross-section an ordinary recording-stylus. Fig. 2 is a similar view, indicating my new record-groove, and indicating in cross-section my new recording-stylus; and Fig. 3 is a horizontal section, on a still larger scale, of my stylus.

Referring to Fig. 1, 20 indicates a portion of a flat tablet such as used for making original recordings. 21 indicates a portion of an ordinary zigzag record-groove already produced therein, and 22 a portion not yet recorded, 23 and 24 denoting the side-walls thereof. 25 represents the usual recording-stylus, showing in horizontal cross-section, and having its two recording-edges 26 and 27 directly opposite each other across the record-groove,—the line 26—27 being also the direction of vibration of this laterally-vibratory stylus 25. It will be noted that each convexity *a*, *b*, *c*, etc., has its corresponding and complementary concavity *a'*, *b'*, *c'*, etc., located directly opposite.

Referring now to Fig. 2, it will be noted that my new recording-stylus 30 has its two oppositely-facing recording-edges 31 and 32 arranged diagonally of the record-groove 33 in the tablet 34; that the two members of each pair of complementary concavities and convexities, as *m—m'*, *n—n'*, etc., lie diagonally across the record-groove from each other, instead of directly opposite each other, and that the respective convexities in one side-wall are slightly in advance of the corresponding and complementary concavities in the other wall thereof.

In Fig. 3, my new recording-stylus 30 is shown on a much larger scale. The diagonal line 40—40 contains the recording-edges, while the transverse lines 41 and 41 indicate the direction of vibration of the recording-stylus as a whole. From this it will be seen that my recording-stylus is provided

with two oppositely-facing recording-edges disposed in a line diagonal to the direction of vibration of the recording-stylus itself.

Having thus described my invention, I claim:

1. A sound-record consisting of a tablet of suitable material having therein a record-groove of substantially uniform depth, and provided with a succession of corresponding and complementary concavities and convexities positioned diagonally from each other.

2. A sound record tablet having a record-groove of substantially uniform depth having lateral irregularities corresponding to sound-waves, each concavity thereof being diagonally opposite its corresponding and complementary convexity.

3. A sound record tablet having a record-groove of substantially uniform depth having in one wall lateral undulations corresponding to sound-waves, and having in the other wall reverse undulations corresponding to the same sound-waves, the first named set of undulations being uniformly in advance of the corresponding undulations in the other wall.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

H. WATERSON,  
HENRY WATERSON, JR.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

---

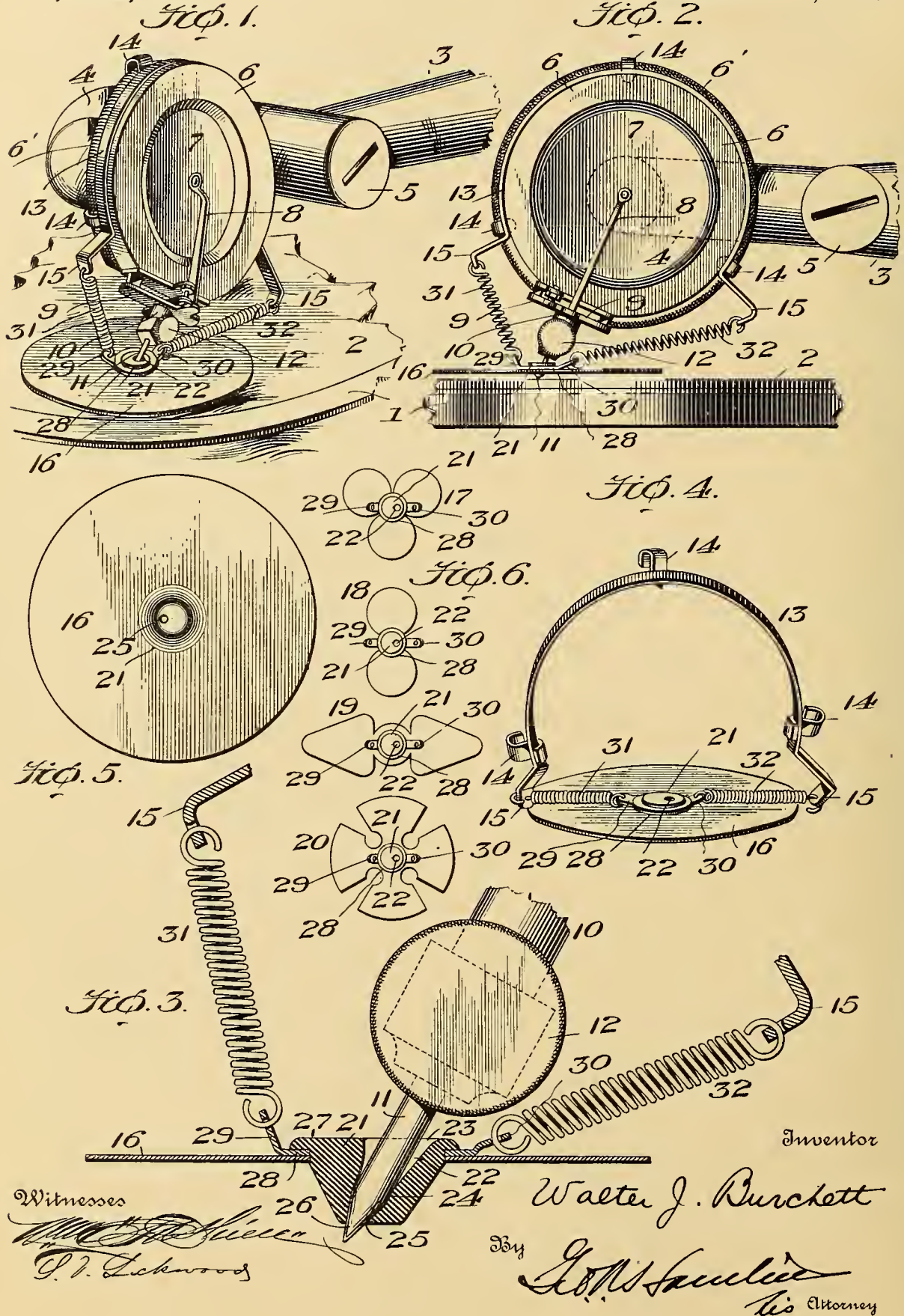




W. J. BURCHETT.  
 CLARIFYING ATTACHMENT FOR TALKING MACHINES.  
 APPLICATION FILED MAY 12, 1913.

1,084,570.

Patented Jan. 13, 1914.



Witnesses

*[Signature]*  
*[Signature]*

Inventor

Walter J. Burchett

By

*[Signature]*  
 His Attorney



# UNITED STATES PATENT OFFICE.

WALTER J. BURCHETT, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE MASTERPHONE CORPORATION, A CORPORATION OF NEW YORK.

## CLARIFYING ATTACHMENT FOR TALKING-MACHINES.

1,084,570.

Specification of Letters Patent.

Patented Jan. 13, 1914.

Application filed May 12, 1913. Serial No. 767,159.

*To all whom it may concern:*

Be it known that I, WALTER J. BURCHETT, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Clarifying Attachments for Talking-Machines, of which the following is a specification.

This invention relates to clarifying attachments for talking machines, and constitutes a further improvement on the general type of apparatus illustrated in the pending application of Matthew B. Clausen, Serial Number 779,004, renewed July 14, 1913.

My object is the provision of a simple, inexpensive and durable attachment which can be quickly and easily applied to or removed from the reproducer of a talking machine, particularly one of the disk type, which will increase the volume of sound, clarify the tone, and enable a needle of small diameter to be used in sound reproduction, thereby increasing the life of the records, and I accomplish these objects by substituting a less rigid connection between the needle of the standard talking machine reproducer, and the thin, freely vibrating sound amplifying body or disk of the said Clausen application than is employed in the specific form of construction illustrated in said Clausen application, and supplementing the engagement between needle and disk by a second, elastic connection between other parts of the reproducer and the disk, whereby the disk is held against the needle with sufficient firmness to absorb the vibrations thereof when the reproducer is in operation, but may yet be easily removed from contact with the needle, (when the latter is to be removed from the reproducer), without entirely disconnecting the disk from the reproducer as a whole.

In the accompanying drawings and following description, I have shown a form of the invention illustrating its mode of operation and which carries out the foregoing objects, but such disclosure is to be considered as illustrative, rather than restrictive, of the scope of the invention and the invention is susceptible of modification without departing from the spirit and scope thereof.

In the accompanying drawings: Figure 1 is a perspective view showing the invention

applied to an ordinary talking machine reproducer and disk record; Fig. 2, a side elevation thereof; Fig. 3, an enlarged detail, partly in section, showing the coöperation of the device with the needle; Fig. 4, a detail perspective of the attachment alone; Fig. 5, a view looking toward the lower face of the thin freely vibrating sheet or disk; and Fig. 6, detail plan views of other shapes of thin freely vibrating sheet or disk that may be used.

Referring to Figs. 1 and 2, 1 represents the turntable of the talking machine and 2 a disk record of usual form and construction, 3 being the usual swinging arm having the neck 4 which is swiveled at 5. The reproducer, which is of the usual form, is shown at 6.

The reproducer has a diaphragm 7, an arm 8, a rocker 9, a needle holder 10 and a removable needle 11 held in the holder 10 by thumb-screw 12.

The foregoing parts are old and well known, operating in the usual manner.

My clarifying attachment appears alone in Fig. 4 and applied to the reproducer 6 in Figs. 1 and 2, the mode of its coöperation with the needle 11 appearing more clearly in Fig. 3, where the parts are generally exaggerated.

An arc-shaped yoke 13 of resilient material is of a size adapting it to be snapped onto the periphery of the reproducer 6, there being provided hook-shaped retainers 14 which engage the knurled edge 6' of the reproducer, these retainers holding the yoke 13 in position and at the same time having such a loose engagement with the knurled edge 6' that the entire yoke 13 can be slid around on the reproducer without detachment therefrom. This adaptability for sliding concentrically with the reproducer body, enables both a manual and an automatic adjustment to be obtained. The yoke 13 has offset or angularly arranged ends 15.

The specific form of yoke above described is adapted to coöperate with one standard form of sound box. Slight variations in details would be desirable to enable it to coöperate conveniently with other standard forms of reproducer.

The thin, freely vibrating sheet of hard, elastic material 16 may be in the form of a circular disk such as shown in Figs. 1 to 5,



or, it may assume different forms such as the winged or lobe-form constructions shown, respectively, at 17, 18, 19 and 20, Fig. 6.

A thin, freely vibrating sheet of hard, elastic material of any form adapted to collect and clarify all vibrations of sound caused by the engagement of the needle with the disk record, will serve the purpose and I do not limit myself to a clarifying sheet or disk of any particular form. The sheet or disk may be of mica, celluloid, or other relatively thin hard, elastic and flexible material of the proper consistency. I do not limit myself to any particular material in the construction of this element of my improved combination.

The disk 16 carries, preferably substantially centrally thereof, a hub 21 which is provided with an opening 22 which preferably tapers from its upper end 23 to at or about the point 24 and then tapers more abruptly to where it opens out at 25 through the lower face of the hub. The lower tapered part 25 of the opening is of a size adapting it to fit against the tapered point 26 of the needle 11, the tip of the latter being exposed and free to engage the grooves on the record disk 2. The upper part 22 of the opening being somewhat larger than the needle, permits the entire sheet or disk 16 to pivot, in a rocking manner, on the needle point 26 and the said disk may, therefore, tilt, pivot or rock within limits in all directions in relation to the needle 11. This construction permits the disk 16 to automatically and instantaneously accommodate itself to all movements of the needle caused by the engagement of the latter with the record disk 2 and to maintain its relation to the face of the disk 2 which is, preferably, a parallel relation thereto, as shown in Fig. 2, but may be other than parallel at times. At the same time the hub 21, and disk 16, are given a sufficiently rigid connection to the needle through the wedgelike engagement of the tapered needle point with the tapered recess 25, to insure the disk taking up all the vibrations of the needle point. The hub 21 may be connected to the disk 16 in different ways. I have shown the hub as provided with a circular flange 27 between which and the disk 16 is located an annulus or collar 28 having ears 29 and 30. The hub, annulus and disk may be cemented or otherwise secured together. Preferably, the head snugly fits the opening in the disk, through which it passes. Light coil springs 31 and 32 are engaged with the ears 29 and 30 and with the ends 15 of yoke 13, said springs being under tension and consequently, drawing the hub 21 against the point 26 of the needle so that the disk 16 is always yieldingly maintained in a light yet firm, engagement with the needle and is free to rock on the point 26 in any direction, within limits.

The modified sheets or disks shown in Fig. 6, have a hub construction 21 and an annulus 28 and ears 29, 30, the same as shown and described in connection with the disk 16.

When in use, the attachment is bodily carried by the reproducer and moves with it and the needle. The looseness of engagement of the retainers 14 with the knurled rim 6' permits either a manual or an automatic concentric sliding of the yoke 13, thus enabling the device to be readily applied to the reproducer, adjusted thereon at any time or to automatically adjust itself under the tension of the springs 31 and 32 according to the operation of the reproducer and its needle. On raising the reproducer and its neck 4 in the usual manner, disk 16 can be removed from the needle 11 and a new needle substituted without having to remove yoke 13 from the reproducer.

During the removal of a worn needle and the insertion of a new one, the disk 16 is pulled up to one side of the stylus or needle holder by the springs and does not interfere with the operation of changing needles. When the new needle is in position the disk is pulled down into position and the perforated hub is snapped into position over the point of the needle. The springs wedge the hub tightly onto the tapering needle end and the whole structure, reproducer and attachment, becomes a resonant, freely vibrating unit which takes up every vibration of the needle point whether horizontal or vertical, and whether body vibrations or molecular vibrations.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination with the reproducer of a talking machine having the usual sound box and stylus, of a thin sheet of hard, elastic material held flexibly about the extreme point of the stylus.

2. The combination with the reproducer of a talking machine having a stylus with a tapering point, of a thin, freely vibrating disk provided with a tapering perforation adapted to fit onto the stylus point, and means for holding the two in engagement.

3. The combination with the reproducer of a talking machine having a stylus with a tapering point, of a thin freely vibrating disk provided with a tapering perforation adapted to fit onto the stylus point, and elastic means for holding the two in engagement.

4. The combination with the reproducer of a talking machine employing the usual stylus, of a thin freely vibrating sheet of hard elastic material, and means for elastically holding the same in removable engagement with the stylus.

5. The combination with the reproducer of a talking machine of a freely vibrating clari-

70

75

80

85

90

95

100

105

110

115

120

125

130

fier disk having a resilient connection therewith whereby said clarifier disk may yield or be moved from its normal position.

5 6. The combination with the needle of a talking machine reproducer, of a clarifier disk having a rocking engagement with said needle.

10 7. The combination with the needle of a talking machine reproducer, of a clarifier disk having a rocking engagement with said needle and elastic means for maintaining said engagement.

15 8. The combination with the reproducer of a talking machine having the usual stylus of a clarifying disk having a rocking engagement with the stylus, and a spring connection extending from the body of the reproducer to the disk near the point of engagement.

20 9. The combination with the reproducer of a talking machine including the usual needle, of a clarifier disk movably engaged with said needle, an attaching device for engaging the reproducer, and a connection between the clarifier disk and said attaching device.

25 10. The combination with the reproducer of a talking machine including the usual needle, of a clarifier disk movably engaged with said needle, an attaching device for engaging the reproducer, and springs attached to the clarifier disk on opposite sides of the needle and also connected to the attaching device.

30 11. An attachment for talking machines comprising an attaching device, a freely vibrating clarifier disk separate from said attaching device, and connections between the said clarifier disk and the attaching device.

40 12. An attachment for talking machines comprising in combination an attaching de-

vice, a freely vibrating clarifier disk, and spring connections between said clarifier disk and said attaching device.

13. An attachment for talking machines, 45 comprising a yoke, hook retainers thereon, a sheet of elastic material serving as a clarifier having a needle hole, and springs connecting the said sheet of elastic material to the end parts of the yoke. 50

14. The combination with the reproducer needle of a talking machine, of a vibratory disk having an opening through which said needle loosely passes.

15. The combination with the reproducer 55 needle of a talking machine, of a vibratory disk having an enlarged tapered opening receiving the needle and point thereof, said opening permitting the disk to move in relation to said needle without detachment. 60

16. The combination with the reproducer of a talking machine including the usual needle, of a vibratory disk having an opening through which the needle passes and whose walls loosely engage the needle, and 65 means connecting the disk to the reproducer.

17. The combination with the reproducer of a talking machine including the usual needle, of a vibratory disk having an opening through which the needle passes and 70 whose walls engage the needle, a detachable and slidable yoke claspings the reproducer, and springs connecting the disk on opposite sides of the needle to the end parts of the yoke. 75

In testimony whereof, I hereunto affix my signature in presence of two witnesses.

WALTER J. BURCHETT.

Witnesses:

HALCOLM ELLIS,  
NATHAN W. PERKINS, Jr.









M. B. CLAUSSEN.  
TALKING MACHINE.  
APPLICATION FILED APR. 5, 1912.

1,084,571.

Patented Jan. 13, 1914.

Fig. 1.

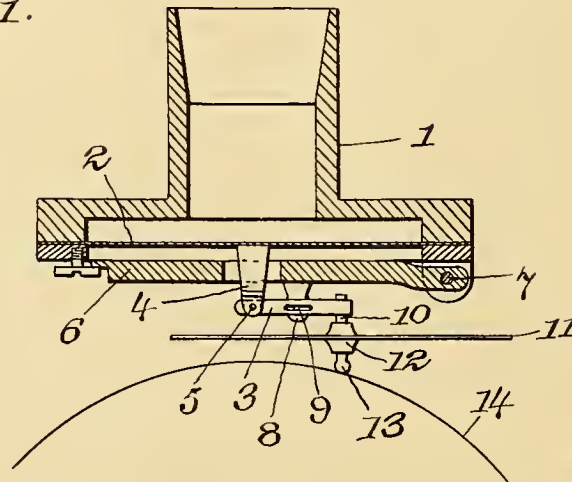


Fig. 4.

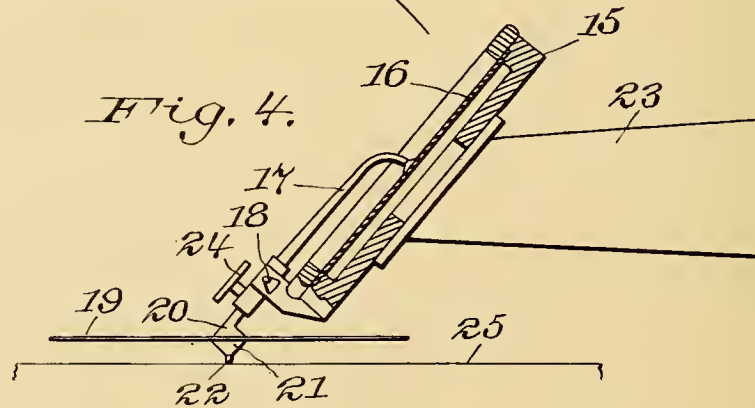


Fig. 2.

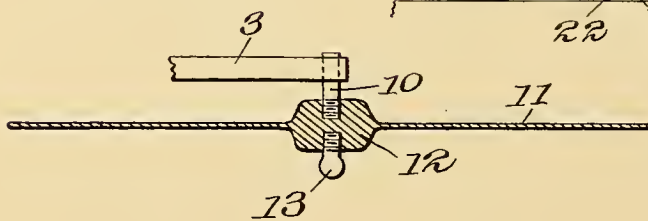
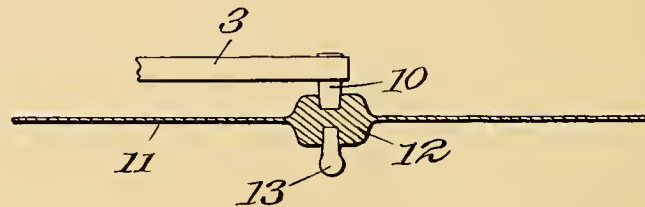


Fig. 3.



Witnesses:  
M. G. Crawford  
M. L. Lottum

Inventor  
Matthew B. Clausen  
By his Attorney R. K. Kuhn

# UNITED STATES PATENT OFFICE.

MATTHEW B. CLAUSSEN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO THE MASTERPHONE CORPORATION, A CORPORATION OF NEW YORK.

## TALKING-MACHINE.

1,084,571.

Specification of Letters Patent.

Patented Jan. 13, 1914.

Application filed April 5, 1912. Serial No. 688,651.

*To all whom it may concern:*

Be it known that I, MATTHEW B. CLAUSSEN, a citizen of the United States of America, residing at New York city, borough of  
5 Manhattan, county and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to the reproducing  
10 apparatus of talking machines and comprises a modification of the invention illustrated and described in my pending application Serial No. 670,146, filed January 9, 1912.

15 The present apparatus is designed especially to coöperate with records having grooves of uneven depth, the sound waves being recorded in the bottom of said grooves instead of in the sides of said grooves.

20 The best form of apparatus embodying my present invention, together with certain modifications thereof, are shown in the accompanying sheet of drawings in which,

25 Figure 1 is a vertical central section of a sound box adapted for use on cylindrical sound records. Fig. 2 is an enlarged detail cross section of the disk which forms the novel feature of my invention. Fig. 3 is a similar view of a modification, and Fig. 4  
30 shows the modification adapted for use on disk records having grooves of uneven depth.

Throughout the drawings like reference characters indicate like parts.

35 Referring to Fig. 1, the sound box 1 has the diaphragm 2 mounted therein in the usual manner.

3 is a stylus arm or lever pivoted at 5 to the lug 4 projecting downward from the  
40 center of the diaphragm 2.

6 is a weight pivoted to the sound box at 7 and provided with a lug 8 which has a pivot 9 engaging the slot shown in the stylus arm or lever 3. In the end of the stylus arm  
45 is the rigidly fastened pin 10 which projects downwardly into the thickened portion or hub 12 formed at the center of the thin disk 11. This pin 10 may be provided with screw thread, as shown in Fig. 2, so that the disk  
50 may be screwed onto it or it may be given a slight taper and forced by pressure into the hub 12, as indicated in Fig. 3.

13 is a bit of highly refractory material such as agate or sapphire, which has one  
55 end shaped to fit into the sound groove on

the record tablet 14, while its other end is either threaded or tapered or otherwise shaped to form a rigid connection with the under portion of the hub 12 of the disk 11. This bit of sapphire therefore serves as the  
60 point of the stylus as a whole.

The above described apparatus is adapted for use with cylindrical records of the kind used on the standard Edison phonograph.  
65

In Fig. 4 I have shown an apparatus designed to be used with disk records in which the sound box 15 is carried on the end of the tone arm 23 in an inclined position and has the usual diaphragm 16 and stylus arm 17  
70 connected directly thereto. The stylus arm is pivoted to the sound box at 18 and has the usual socket and coöperating set screw 24 for holding the needle or other terminal piece which directly engages the sound  
75 record.

19 is a disk similar to that previously described which is cemented or otherwise fastened to the properly prepared and shaped face of the shank piece 20 which is adapted  
80 to have its other end inserted in the socket in the end of the stylus arm 17. On the other and under side of the disk is cemented a block 21 in which is set a reproducing point 22 which as before consists of a bit of  
85 highly refractory material such as sapphire or the like. The shank 20, the disk 19 and the block 21 are cemented together to form one rigid unitary structure.

25 is the disk record having a sound  
90 groove of uneven depth therein with which sound groove the reproducer point 22 engages.

In all forms of the invention the essential feature is that a disk of vibratable material  
95 shall be rigidly attached to the point of the reproducer which engages the record and be substantially parallel to the surface of the sound record at and near the point of contact between the reproducer and the record.  
100 In the construction shown in Fig. 4 the disk is substantially parallel with the flat disk record 25. In the form shown in Fig. 1, the disk is substantially parallel with that portion of the surface of the cylindrical  
105 record in contact with the reproducing point, that is to say it is substantially parallel to a plane which would be tangent to the cylinder at that point.

In operation, the rotation of the record  
110



causes up and down vibrations of the stylus point which are transmitted in each case through the stylus arm to the diaphragm in the usual way. At the same time the vibrations so impressed upon the stylus as a whole are transmitted to the disk 11 or 19 as the case may be. This disk may be made of any reasonably dense and hard material which will vibrate satisfactorily.

10 Metal may be used or hard fiber or even parchment, but as at present advised, I prefer to use celluloid and generally speaking find that disks of non-metallic material give purer reproductions of sound than metallic disks. While disks of different thickness and diameter may be employed, I obtain good results with a celluloid disk about 20/1000 of an inch thick and two inches in diameter.

20 With many sound records the best results are obtained with a disk of 15/1000 of an inch in thickness. In all cases a very thin disk should be employed of a thickness considerably less than the diameter of the stylus.

25 The advantages of the invention consist in the greatly increased volume of sound reproduced and the more clear and accurate reproduction of the tone qualities, articulation, &c.

30 Various changes could be made in the details of construction here shown without departing from the principle of the invention so long as the stylus arm or lever is rigidly attached to one side of the disk and the reproducing point is rigidly attached to the other side of the disk.

Having, therefore, described my invention, I claim:

40 1. In a talking machine, the combination with a stylus arm of a freely vibrating sound reproducing disk attached to the end thereof, and a bit of refractory material shaped to engage the groove in the sound record on said disk, the said disk having a diameter many times that of the stylus arm or bit of refractory material, and a thickness considerably less than said diameter of the stylus arm or bit of refractory material.

50 2. In a talking machine the combination with a stylus arm of a thin disk of non-metallic material with a thickened portion at the center, and a jewel shaped to engage the groove in the sound record set in one side of the thickened portion of the disk, the end of the stylus arm being attached to the other side of the thickened portion of the disk.

55 3. In a talking machine the combination with the stylus arm of a freely vibrating sound reproducing disk of non-metallic material to one side of which the end of the

stylus arm is connected, and a bit of refractory material shaped to engage the groove in the sound record attached to the other side of the disk, said disk having a diameter many times that of the stylus arm or bit of refractory material, and a thickness considerably less than said diameter of the stylus arm or bit of refractory material.

4. In a talking machine the combination with a stylus arm of a disk of non metallic material to one side of which the end of the stylus arm is connected and a bit of refractory material shaped to engage the groove in the sound record attached to the other side of the disk, the points of both said attachments being near the center of the disk and said disk being built up at the points of attachment to an increased thickness.

5. In a talking machine the combination with a stylus arm of a thin disk of celluloid attached to the end of the stylus arm and a bit of refractory material shaped to engage the groove of the sound record attached to the other side of the disk.

6. In a talking machine the combination with a stylus arm of a thin disk of celluloid attached to the end of the stylus arm and a bit of refractory material shaped to engage the groove of the sound record attached to the other side of the disk, the disk being thickened at the points of attachment.

7. In a talking machine the combination with a jewel reproducer point and supporting stylus arm therefor, of a freely vibrating sound reproducing disk of elastic material rigidly attached to said jewel and free from contact with any other part of the apparatus except the stylus arm, said disk having a diameter many times that of the stylus arm or bit of refractory material and a thickness considerably less than the diameter of said stylus arm or bit of refractory material.

8. In a talking machine the combination with a reproducer tip of refractory material and supporting stylus arm therefor of a freely vibrating sound reproducing disk of elastic material rigidly attached to said reproducer point in a position to be parallel to the surface of the sound record, at or near its point of contact with the reproducer tip, said disk having a diameter many times that of the stylus arm or bit of refractory material, and a thickness considerably less than said diameter of the stylus arm or bit of refractory material.

MATTHEW B. CLAUSSEN.

Witnesses:

A. PARKER-SMITH,

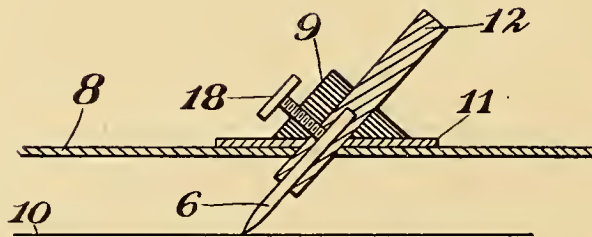
M. G. CRAWFORD.



M. B. CLAUSSEN.  
TALKING MACHINE.  
APPLICATION FILED APR. 12, 1912.

1,084,572.

Patented Jan. 13, 1914.



Witnesses:  
*W. G. Crawford*  
*R. K. Kins.*

Inventor  
*Matthew B. Clausen*  
By his Attorneys *W. H. Kins.*



# UNITED STATES PATENT OFFICE.

MATTHEW B. CLAUSSEN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO THE MASTERPHONE CORPORATION, A CORPORATION OF NEW YORK.

## TALKING-MACHINE.

1,084,572.

Specification of Letters Patent.

Patented Jan. 13, 1914.

Application filed April 12, 1912. Serial No. 690,446.

*To all whom it may concern:*

Be it known that I, MATTHEW B. CLAUSSEN, a citizen of the United States of America, residing at New York city, borough of  
5 Manhattan, county and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements on  
10 the particular form of attachment to talking machines illustrated and described in my application Serial No. 670,146, filed January 9, 1912, in which is shown a thin sound amplifying disk rigidly mounted on  
15 the stylus of the reproducer of a talking machine. In the one particular form of my invention selected for illustration in said prior application the reproducing needle is clamped into the socket on the end of the  
20 stylus arm in the usual way, and the disk is held on the needle by being bored to form an opening of an internal diameter equal to or slightly less than the external diameter of the needle. This requires the needle to  
25 be forced through the disk before using, and, as it is not safe to use a needle on more than one record, it is necessary to pull the needle out of the disk every time a new record is put on, and stick a new needle  
30 through the disk before fastening the needle to the stylus arm for the next operation of the machine. While this can easily be done with a small pair of tweezers, the entire operation can be avoided by the use  
35 of my present invention which comprises means for permanently attaching the disk to the stylus arm, and means for mounting the needle in this attaching means by any simple device such as a set screw. Consequently when a needle is worn it can be  
40 loosened from the disk, removed and a new one fastened to the disk without unfastening the disk from the reproducer.

The drawing shows a vertical central section of the preferred form of apparatus embodying my invention.

In the construction shown, the disk 8 is made of any material capable of reproducing vibrations similar to sound waves. I  
50 have found celluloid to be a convenient material for this purpose. Disk 8, reinforcing disk 11 and hub 9 are forced on to a short

bar 12, preferably formed of a hard fiber like bamboo, which may be gripped in the usual socket at the end of the arm which together with the needle 6 forms the stylus in the standard type of reproducer. This short bar 12 practically forms an extension of the hub 9. The steel needle 6 is then set in this piece 12 and may be held there rigidly by a set screw 18 mounted in a hole in the side of the hub 9. This arrangement permits the removal of needle 6 from the reproducer and replacement of a new needle without removing disk 8. By making the longitudinal bore of shaft 12 large enough to take in a commercial needle of the largest diameter, it also becomes possible to use needles of lesser diameter, without materially reducing the rigidity of the joint between  
70 the disk and needle. This renders it possible to use the same disk with all sizes of needles, while with the form of the invention illustrated in my prior application, a given disk can only be used with that size of needle  
75 which can just fit into the bore of the hub and form a rigid connection therewith.

While a soft roundness of tone is given to the sound reproduction by making bar 12 of non-metallic material, metal may be used  
80 for the purpose where durability is more important than the quality of the reproduction.

While the vibrating sheet of material 8 is usually a circular disk, it may be made of  
85 any other convenient form.

Having described my invention, I claim:

1. An attachment for talking machines having the usual form of reproducer, which said attachment comprises a thin, freely vibrating sound amplifying disk, said disk having a hub-like projection adapted to engage the stylus arm of the talking machine reproducer and also being provided with a socket for receiving the usual form of reproducer needle, together with means for clamping said needle in said socket.

2. An attachment for talking machines, having the usual form of sound box and stylus arm, which said attachment comprises  
100 a thin, freely vibrating sound amplifying disk provided with a hub having an extension adapted to engage the stylus arm, and which hub is provided with a socket adapt-

ed to receive the usual form of needle, together with a set screw mounted in said hub, and adapted to engage said needle.

3. In a reproducer for talking machines  
5 the combination of a thin, sound amplifying sheet of elastic material, a short bar rigidly attached to the said sheet at one end, bored out at that end to receive a needle,

and adapted to be clamped to the stylus arm of a reproducer, and a set screw for holding a needle firmly in the bore of the above mentioned bar. 10

MATTHEW B. CLAUSSEN.

Witnesses:

A. PARKER-SMITH,

M. K. LOTTERER.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

---





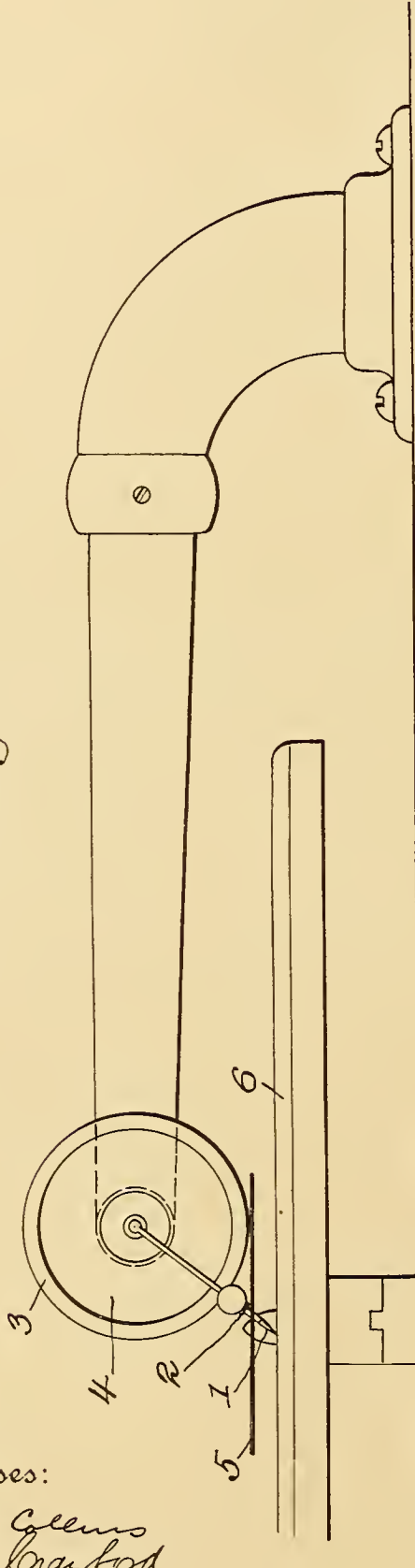
M. B. CLAUSSEN.  
TALKING MACHINE.

APPLICATION FILED JAN. 9, 1912. RENEWED JULY 14, 1913.

1,084,573.

Patented Jan. 13, 1914.

Fig. 1



Witnesses:

*F. A. Glenn*  
*M. G. Crawford*

Fig. 3.

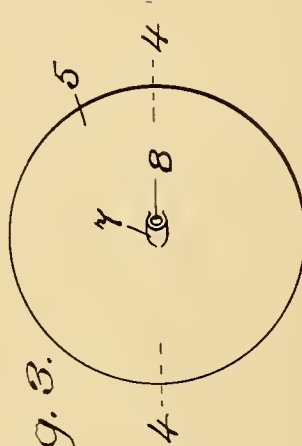


Fig. 2.

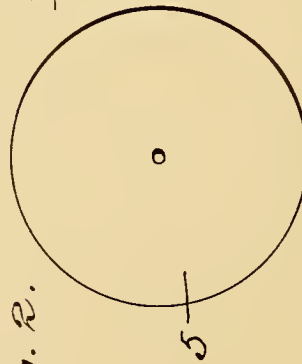


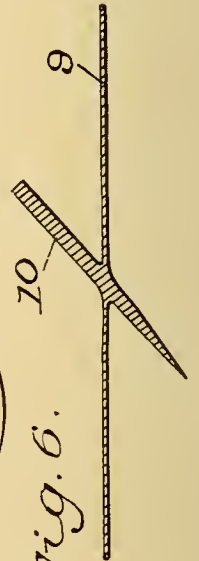
Fig. 4.



Fig. 5.



Fig. 6.



Matthew B. Claussen Inventor

# UNITED STATES PATENT OFFICE.

MATTHEW B. CLAUSSEN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO THE MASTERPHONE CORPORATION, A CORPORATION OF NEW YORK.

## TALKING-MACHINE.

1,084,573.

Specification of Letters Patent.

Patented Jan. 13, 1914.

Application filed January 9, 1912, Serial No. 670,146. Renewed July 14, 1913. Serial No. 779,004.

*To all whom it may concern:*

Be it known that I, MATTHEW B. CLAUSSEN, a citizen of the United States of America, residing at New York city, county of New York, State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to talking or sound reproducing machines in which a stylus travels in a groove in a tablet or cylinder having variations of surface corresponding to sound waves. It is well known that in apparatus of this kind heretofore in use the loudness of reproduction may be increased by increasing the stiffness of the reproducing stylus, as by making said stylus of greater cross section, but this results in a disadvantage in that the reproduction is then less clear and faithful. On the other hand it is recognized that the clearness, delicacy and faithfulness of the reproduction may be enhanced by making the reproducing stylus light, as by reducing its cross section, but this reduces the volume of sound.

I have discovered an improvement which may be applied to any of the standard forms of talking machine by which both the volume and clearness, or faithfulness, of the sound reproduction, are markedly increased and improved.

Briefly stated, my invention in its simplest form comprises the rigid attachment of a disk of convenient form to the standard form of reproducing stylus or needle.

The best form of apparatus at present known to me embodying my invention and sundry modifications thereof are illustrated in the accompanying sheet of drawing in which,

Figure 1 is a side elevation of a portion of a talking machine showing the reproducer with my invention attached. Fig. 2 is a plan view of the simplest form of disk attachment constituting the novel element of my invention. Fig. 3 is a similar view of a modification. Fig. 4 is a vertical central section on line 4—4 of Fig. 3 showing also the reproducer stylus or needle in position. Fig. 5 is a similar view with a different kind of stylus, and Fig. 6 is a similar view of a modification.

Throughout the drawings like reference characters indicate like parts.

1 is the ordinary reproducing stylus or

needle which, in the familiar form of talking machine employing a flat record tablet with sinuous groove of even depth therein, is usually a short steel needle set in arm 2, which is pivoted on sound box 3, and has its other end connected to diaphragm 4 in said sound box. This and the other portions of apparatus shown or indicated in Fig. 1 are of standard form. To the stylus or needle 1 I rigidly attach a disk 5 so arranged as to be supported clear of the record tablet 6. This rigidity of connection between stylus and disk is important and may be heightened by making the disk thicker at the point where the stylus passes through it. Thus as shown in Figs. 3, 4 and 5, the disk may be formed with an inclined hub 7 through the fine perforation 8 in which the stylus may be forced under pressure so as to effect a rigid connection between the two. Again, as shown in Fig. 6, a disk 9 may be made integral with a stylus 10. In such latter case the disk and stylus may be made of steel or other metal, or they may be formed of any non-metallic materials which are of sufficient elasticity to receive and reproduce sound vibrations, such as celluloid, gutta percha, papier mâché, etc. When a stylus made of metal or of a refractory mineral is used and the disk is of a material which may be rendered plastic by heat and then molded, as in the case of celluloid, gutta percha, etc., said disk may be cast or molded on the needle or stylus while in a plastic condition and forced into intimate contact therewith by pressure. When a plain disk is used such as is shown in Fig. 2, any material sufficiently elastic to receive and give out sound vibrations may be used. The result of the attachment of these disks to the stylus of any sound reproducing machine is a very great increase in the clearness, accuracy, and delicacy of the sound reproduction. If the record is a musical one, the accompaniment, which is often practically indistinguishable when my invention is not used, comes out clearly when my improvement is employed. If the record contains a concerted piece, every instrument and voice can be distinguished by the ear, and talking records are reproduced with perfect articulation and every inflection exact. All this is accomplished not only without reducing the volume of reproduced sound, but with a marked increase of such volume, so that with even a cheap machine a reproduc-



tion is attained of volume almost if not quite equal to that of the original sounds from which the records were made.

In Fig. 5 I have indicated a stylus 11, provided with a rounded point such as may be made of a jewel or refractory mineral. My invention lends itself to use with this type of stylus with equal facility.

While I have shown round disks as most convenient in form, sheets of other shapes, square, oval, rectangular or polygonal could be used. The portion of the disk or sheet through which the stylus passes may be thickened in other manners than by the hub 7 which I have illustrated as one form of such thickening. It should also be understood that by the expression "stylus," I may include not only the needle pointed extension 1, but also the vibrating arm or lever 2 in which such needle 1 is mounted, the whole structure vibrating in unison during sound reproduction, and transmitting said vibration to diaphragm 4.

While various explanations may be given of the improved results obtained by my invention, my present belief is that they are mainly due to the fact that the disk 5 is really a supplemental diaphragm which, being fastened to the stylus near its point, vibrates with every slightest movement imparted from the record and so faithfully reproduces all the overtones and finer vibrations which otherwise might be lost or blurred in transmission through the heavier sound box 3. The result is that the sum of all the vibrations heard by the listener is clarified, enriched and increased by the action of my improvement. Again, it may be that in the operation of an ordinary machine certain false vibrations may be created in the sound box itself which are not created in the free disk carried near the point of the stylus, and thus the relative proportion of such false vibrations and metallic tones produced thereby is reduced with respect to the entire volume of tone produced, and so the general accuracy of the total resulting reproduction is increased.

While the advantages above described result from the use of any disk or sheet of hard elastic material, the best results so far as I am at present informed result from the use of disks of white celluloid, or ivory, of about two inches in diameter and an average thickness of approximately one thirty-second of an inch, although, for many sound records, disks from one to two hundredths of an inch in thickness give the best results.

The main advantage of my invention resides in the fact that it amplifies the volume of reproduced sounds and also makes the reproduction more clear and accurate by reproducing certain vibrations not taken up by the main diaphragm. The sound box

diaphragm, being located in a plane at right angles to the plane of the record, responds only to the lateral vibrations of the stylus. There are, however, certain vibrations given to the stylus in planes perpendicular to the plane of the record tablet, as it is dragged along the sound record groove, although the lateral vibrations are the principal ones. The disk, or other thin sheet of material capable of having sound vibration impressed upon it, which is located in a plane parallel to that of the record, in my invention, and is carried by the stylus as close to the point thereof as possible, is capable of taking up and reproducing any such perpendicular vibrations given to the stylus. Thus all the vibrations in both directions are taken up and all tones are faithfully reproduced.

Having, therefore, described my invention, I claim:

1. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a freely vibrating thin, sound amplifying disk mounted directly on the reproducing stylus.

2. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a freely vibrating thin, sound amplifying disk mounted directly on the reproducing stylus and rigidly connected thereto.

3. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto of a freely vibrating thin, sound amplifying disk of non-metallic material mounted directly on the reproducing stylus.

4. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a freely vibrating thin, sound amplifying disk of non-metallic material mounted directly on the reproducing stylus and rigidly connected thereto.

5. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a disk of celluloid mounted directly on the reproducing stylus.

6. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a disk of celluloid mounted directly on the reproducing stylus and rigidly connected thereto.

7. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus designed to engage a sound record when the machine is in operation, of a thin, sound amplifying disk whose superficial area is many times the cross section of the stylus, rigidly



mounted on the stylus near the point thereof.

8. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a disk of celluloid mounted directly on the reproducing stylus, said disk having a thickened portion at or near the center through which the stylus passes.

9. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto, of a disk mounted directly on the reproducing stylus, said disk having a thickened portion at or near the center through which the stylus passes.

10. The combination with a talking machine having the usual sound box, diaphragm and reproducing stylus connected thereto of a disk of non-metallic material mounted directly on the reproducing stylus, said disk having a thickened portion at or near the center through which the stylus passes.

11. In a talking machine having a stylus inclined to the plane of the record surface, a freely vibrating, thin sound amplifying disk rigidly attached to the stylus and so arranged as to clear the record when the stylus is in proper operative position.

12. In a talking machine having a stylus inclined to the plane of the record surface, a freely vibrating, thin sound amplifying disk of non-metallic material rigidly attached to the stylus and so arranged as to clear the record when the stylus is in proper operative position.

13. A reproducing stylus for use in talking machines having a disk of celluloid rigidly attached and so arranged as to clear the record when the stylus is in proper operative position.

14. A reproducing stylus for use in talking machines having a disk rigidly attached and so arranged as to clear the record when the stylus is in proper operative position, said disk having a thickened portion at or near the center through which the stylus passes.

15. In a talking machine the combination of a reproducing stylus and a sound reproducing and amplifying disk rigidly mounted thereon, said disk being free from contact with any other portion of the talking machine.

16. In a talking machine the combination of a reproducing stylus and a sound reproducing and amplifying disk of non-metallic material mounted thereon and rigidly attached thereto, said disk being free from contact with any other portion of the talking machine.

17. In a talking machine the combination of a reproducing stylus and a disk of celluloid mounted thereon, said disk being free from contact with any other portion of the talking machine.

18. The combination with a talking machine having the usual stylus designed to engage a sound record when the machine is in operation, of a thin freely vibrating sound amplifying body of material rigidly mounted on said stylus and free from contact with any other portion of the machine, the superficial area of said thin body of material being many times the cross section of the stylus.

19. In a reproducer for talking machines, the combination with the usual stylus and sound box containing a diaphragm located in a plane at right angles to the plane of the sound record designed to cooperate with said sound box, of a thin sheet of material capable of having sound vibrations imparted to it, attached to the stylus and supported thereby at the center only, so as to leave its edges free to vibrate, and located in a plane parallel to that of the sound record.

20. In a reproducer for talking machines, the combination with the usual stylus and sound box containing a diaphragm located in a plane at right angles to the plane of the sound record designed to cooperate with said sound box, of a thin sheet of material capable of having sound vibrations imparted to it, attached to the stylus and supported thereby solely at the center so as to leave its edges free to vibrate, and located in a plane at right angles to the plane of the sound box diaphragm.

MATTHEW B. CLAUSSEN.

Witnesses:

A. PARKER-SMITH,  
M. G. CRAWFORD.







P. J. MUKAUTZ.  
SOUND BOX.  
APPLICATION FILED JAN. 25, 1913.

1,085,354.

Patented Jan. 27, 1914.

FIG. 1

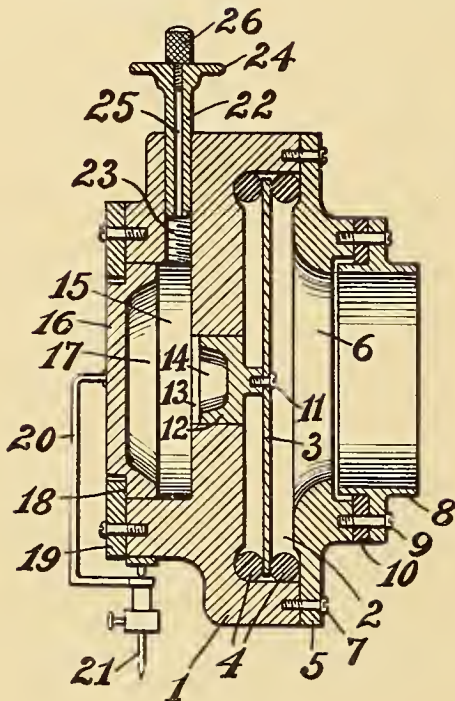


FIG. 3

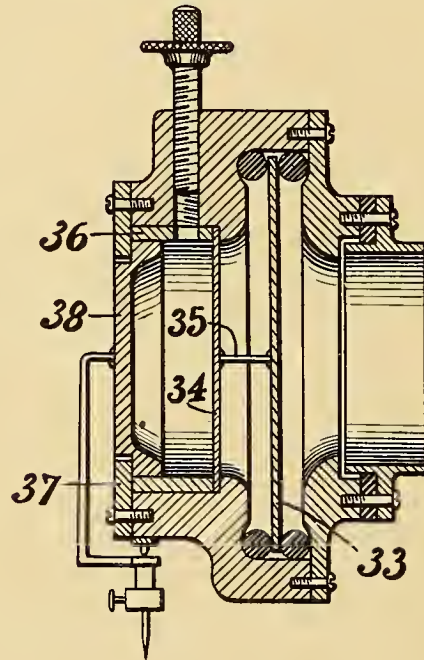
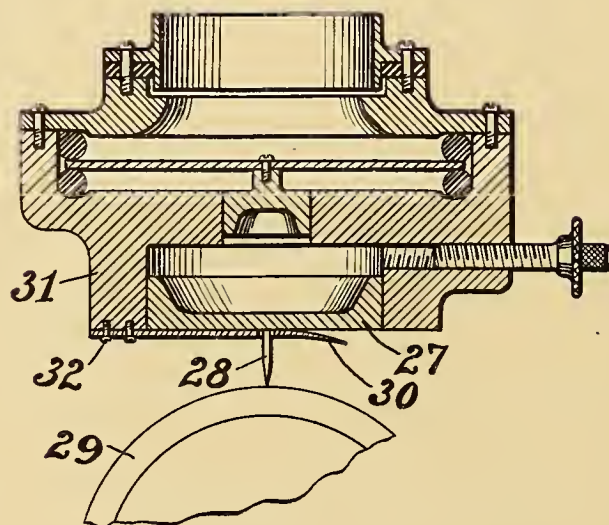


FIG. 2



Witnesses  
*W. H. Halsey*  
*J. M. Thayer.*

Inventor  
*Peter J. Mukautz*  
By *W. H. Halsey*  
his Attorney

# UNITED STATES PATENT OFFICE.

PETER J. MUKAUTZ, OF CHICAGO, ILLINOIS.

## SOUND-BOX.

1,085,354.

Specification of Letters Patent.

Patented Jan. 27, 1914.

Application filed January 25, 1913. Serial No. 744,162.

*To all whom it may concern:*

Be it known that I, PETER J. MUKAUTZ, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in sound-boxes for use in connection with sound recording or reproducing machines.

The principal object of the invention is to provide a sound-box, which will so actuate the needle or stylus as it travels over the surface of the record, that clean cut smooth grooves will be traced therein; and in reproducing said record, the tones obtained will be intensified, clear and free from harsh or grating sounds. This is accomplished by confining air or a liquid between a pair of oppositely arranged cupped pistons of different diameters.

Another object of this invention is to provide means for regulating the air or liquid pressure between the pistons, in order to get the best results from the sound-box either in making a record or reproducing the same.

With the above and other objects in view as will be understood, the invention will be hereinafter fully described in connection with the accompanying drawings which simply illustrate a preferred embodiment thereof, and the novel features of the invention will be distinctly pointed out in the appended claims.

In the drawings, Figure 1 is a sectional elevation of a sound-box constructed in accordance with my invention, for use in connection with a laterally undulating record groove machine. Fig. 2 is a similar view showing a sound-box for an up-and-down record groove machine, and Fig. 3 illustrates a modification of Fig. 1.

Referring to Fig. 1 of the drawings, 1 represents an annular body which is hollowed out from one end as indicated at 2 for inclosing a suitable diaphragm 3 supported between a pair of rubber rings 4 in the usual manner. A cap flange 5 having a central opening 6 is fixed to the end of the body 1 by screws 7, and a flanged funnel 8 for receiving the sound horn, is secured to said cap flange by screws 9. A rubber or similar washer 10 is preferably inserted between the face of the cap flange 5 and the flange of the funnel 8. The diaphragm 3 is connected

at 11 to a piston 12 which is operatively mounted in a bore 13 of the body 1. The piston 12 is preferably cupped out as shown at 14.

The annular body 1 is recessed at its other end as indicated at 15, and slidably mounted therein is a piston 16 preferably of larger diameter than the piston 12. The piston 16 is also cupped out as shown at 17. In order to retain the piston 16 in the recess 15, the outer face of the piston is turned down to form an annular shoulder, and a flange ring 19 which is fastened to the end of the body 1 serves as an abutment for said annular shoulder. A needle arm 20 is fixed to the outer face of the piston 16 and carries a needle 21 as in the ordinary construction.

The space between the pistons 12 and 16 is adapted to contain air or a liquid, for the purpose of forming a cushion to prevent sudden or jerky movements of the pistons, and thereby avoid corresponding movements of the needle 21 or the diaphragm 3. In order to regulate the air or liquid pressure between the pistons 12 and 16 to suit different conditions, and thereby obtain the best records or reproductions, the following means are provided. A plunger valve 22 is adjustably screwed into a correspondingly threaded opening 23 in the body 1 and is provided with a knurled head 24, by means of which the same may be conveniently turned. A vent 25 extends through the plunger valve to admit air or a liquid, or permit the same to escape, and said vent is closed by a plug 26 which is threaded into its outer end.

The sound-box shown in Fig. 2 and suitable for an up-and-down record groove machine is similar to the one already described, except that the sound-box is arranged with its piston 27 extending downwardly and carrying a needle 28 which is adapted to rest on a cylinder record 29. A flat spring 30 is fixed to the lower end of the body 31 of the sound-box, as indicated at 32, for resiliently supporting the piston 27.

In the modification of Fig. 1, illustrated by Fig. 3, the diaphragm 33 is connected to a smaller diaphragm 34 by a post 35, and a band ring washer 36 arranged between the peripheral face of the diaphragm 34 and the flange ring 37 is employed to hold said diaphragm in position. In this construction



air is preferably confined between the diaphragms 33 and 34, and a liquid in the space between the latter diaphragm and the piston 38.

5 Assuming that it is desired to make a record and the sound-box illustrated by Fig. 1 is fitted to the machine, the vibrations of the voice or other sounds are transmitted from the diaphragm 3 to the smaller piston 12, thence to the larger piston 16 through the medium of the air or liquid in the space between said pistons. As the piston 16 is of greater area than the piston 12, increased pressure will be exerted by the larger piston, and consequently the vibrations transmitted by the diaphragm 3 will cause intensified action upon the needle 21. The air or liquid confined between the pistons by acting as a cushion will prevent sudden or jerky vibrations being transmitted to the piston 16 and then to the needle 21. This will produce a deep clean cut record.

It will be understood from the foregoing, that when a sound-box constructed in accordance with my invention is used on a reproducing machine; the sounds obtained will be clear and distinct, and if the piston 12 is made larger than the piston 16, the sounds will be intensified.

30 In order to regulate the pressure of the air or liquid confined between the pistons 12 and 16, the plunger valve may be turned inwardly to decrease the space between said pistons thereby increasing the pressure, or turned in the reverse direction to decrease the pressure. The plug 24 may be removed to admit air or liquid, or allow the same to escape.

Although the construction set forth and described is well adapted to accomplish the intended purposes, it is to be understood that slight changes may be made without sacrificing any of the advantages or departing from the spirit of the invention.

45 Having fully described my invention, what I claim is:

1. In a sound-box, the combination of a body, a diaphragm supported within the body, a piston arranged in spaced relation to the diaphragm, a needle actuated by the piston, and means for decreasing or increasing the volume of the space between said diaphragm and said piston, substantially as described.

55 2. In a sound box, the combination of a body, a diaphragm supported within the body, a piston arranged in spaced relation to the diaphragm, a needle actuated by the piston, and an adjustable plunger valve for changing the volume of the space between

said diaphragm and said piston, substantially as described.

3. In a sound-box, the combination of a body, a diaphragm supported within the body, a piston arranged in spaced relation to the diaphragm, a needle actuated by the piston, a plunger valve adjustably threaded into the body for changing the volume of the space between said diaphragm and said piston, the plunger valve being provided with a vent, and a removable plug for the vent, substantially as described.

4. In a sound-box, the combination of a body, the body being hollowed out from one end, a diaphragm supported within the hollowed out portion of the body, a cap fixed to the hollowed out end of the body, a piston connected to the diaphragm, the other end of the body being provided with a recess extending to the piston, a second piston operatively mounted in the recess for receiving the vibrations of the diaphragm, means for decreasing or increasing the volume of the space between said pistons, and a needle actuated by the second mentioned piston, substantially as described.

5. In a sound-box, the combination of a body, the body being hollowed out from one end, a diaphragm supported within the hollowed out portion of the body, a cap fixed to the hollowed out end of the body, a piston connected to the diaphragm, the other end of the body being provided with a recess extending to the piston, a second piston operatively mounted in the recess for receiving the vibrations of the diaphragm, the body being provided with a threaded opening leading to said recess, a plunger valve adjustably screwed into said threaded opening, the plunger having a vent therethrough, a removable plug for closing said vent, and a needle actuated by the second mentioned piston, substantially as described.

6. In a sound-box, the combination of a body, a diaphragm supported within the body, a piston arranged in spaced relation to the diaphragm, a needle actuated by the piston, an adjustable plunger valve for changing the volume of the space between said diaphragm and said piston, the plunger valve being provided with a vent, and means for closing and opening the vent, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PETER J. MUKAUTZ.

Witnesses:

A. SIDLEY,  
GEORGE F. GESSNER.







# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

PHONOGRAPH SOUND-BOX.

1,085,848.

Specification of Letters Patent.

Patented Feb. 3, 1914.

Application filed March 11, 1911. Serial No. 613,813.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonograph Sound-Boxes; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make, construct, and use the same.

The object of my invention is to so construct a sound box that it may be rigidly secured to a support therefor, and at the same time dispense with what has been termed a floating weight for preserving the requisite degree of pressure of the stylus upon the phonograph record, while such stylus is given a freedom of movement not hitherto accomplished in structures of the kind and purpose.

Another object is to improve the stylus holder in the direction of cheapness of construction and effectiveness in operation.

Another object is to improve the means for throwing the stylus out of operative relation with the phonograph record with which it is intended to be used.

Other improvements in the forms of construction or operation will be disclosed in the course of the following detailed description in connection with the accompanying drawings which form a part of this specification.

In the drawings Figure 1 is a side elevation of the sound box, showing the stylus thrown out of operative position. Fig. 2 is a vertical section of the same, showing the stylus in operative position; each of these figures show the same operative mechanisms. Fig. 3 is a view similar to Fig. 1, but with a different form of stylus shifting device. Fig. 4 is a side view showing another form of stylus lever. Fig. 5 is a plan view of the blank and Fig. 6 is a perspective view of the same as it is pressed into shape to form the supporting bracket for the stylus lever. Fig. 7 is a perspective view of the stylus lever. Fig. 8 is a plan view of the blank and Fig. 9 is a perspective view of the same as it is pressed into shape to form the stylus lever pivot bearing. Figs. 10 and 11

are perspective views of different forms of devices for throwing the stylus out of action. Figs. 12, 13 and 14 are respectively, views of the blank, the side and the end of the stylus holder. Fig. 15 is a perspective view of the form of stylus lever shown as a modification in Fig. 4. Fig. 16 is a sectional view of the eye-stud connection with the diaphragm.

Similar letters of reference refer to like parts throughout the specification and drawings.

It should be stated at this point that all metal parts of my improved sound box are made of sheet metal, pressed or cut to shape, so as to reduce the cost of manufacture to the lowest point possible, consistent with accurate and efficient results.

The box body 1, is made of a circular disk of metal pressed to the shape in cross-section as shown in Fig. 2. Thus formed, it consists of the slightly coned (nearly cylindrical) part 2, the flat annular part 3, so as to form the second annular part 4, with the rounded connecting part 5; next comes the annular bead 6 and finally the cylindrical connecting ring 7. This body part 1, is struck out of the disk of sheet metal in the usual way, by a punch and die, as will be readily understood by those familiar with drawing punch and die work. The retaining ring 8, with its flanges 9 and 10, is also formed in the same manner.

The diaphragm 11, is made of celluloid, mica, glass, sheet copper, or any one of the usual or desired materials from which such parts may be made, and is held in position between the flange 9, and the annulus 3, by means of the rubber gaskets 12, and if desired, the additional paper gaskets 13; these gaskets being located on both sides of the diaphragm as shown. As a convenient method of securing the ring 8, in position, after the diaphragm is in place, the body 2 is indented at various points around its outside, as shown at 14, such indentations extending in to a depth sufficient to grip, or even indent the face of the ring 8. In this manner, I form a very convenient and cheap method of connecting the parts together, without the use of screws, rivets or the like. In order to elongate the connecting ring 7,



I may secure thereon by "sweating," or otherwise, the thimble 16, so as to form a convenient means for securing the entire structure to the instrument upon which it is to be used.

Secured to the back of the box body 2, and more specifically, to the annulus 4, is the supporting bracket 17, designed to carry the adjusting devices for the stylus. This bracket is constructed of sheet metal, first blanked out on the shape shown in Fig. 5, with the two arms 18, the central lug 19, the laterally projecting lugs 20, and the extension 21. When the parts are bent to shape and finished, the bracket is in the form as shown in Fig. 6, with the lug 19, bent rearwardly and upwardly, and its end provided with an aperture, to receive the end of a tension spring 22, as seen in Figs. 1 to 4. The upper end of the bracket blank is bent at right angles as shown, and the aligned apertures 23 and 24 are provided to receive the pivot pin 25. The laterally projecting lugs 20 are bent either upwardly as shown in Fig. 3, or downwardly, as shown in Figs. 1, 2 and 4, to receive the stylus lever operating device 26, or 27, as the case may be. In order to provide for these operating devices, and permit their convenient location, I have made a slot 28 in the horizontal part of the bracket, so that in case the device 26, is used, the cam 29 may turn in said slot 28; and when the device 27, is used, the upwardly extending central arm 30, will project through the slot 28, and be limited in its throw by the ends of said slot. In each case it will be understood, that the lugs 20 are provided with apertures to receive the pivotal ends of the devices 26 or 27. Mounted upon the pivot pin 25, is a pivotal support 31, for the stylus lever 32. This support 31, is blanked out of sheet metal in the form shown in Fig. 8, after which the apertured lugs 33, and 34, are bent up at right angles to the plane of the blank as shown in Fig. 9. The lugs 33 are for pivotally carrying the support upon the pin 25, while the lugs 34, are for pivotally carrying the stylus lever. This lever is of the general shape as shown in Fig. 7, and is provided with the upper horizontal part 35 and the vertical part 36, at substantially right angles to each other. Projecting rearwardly from the upper end of the part 36, are the two supporting lugs 37, which are pivotally secured to the support 31, by the pivot pin 38. The rear end of the part 35, is provided with the aperture 39, to receive the upper end of the tension spring 22, heretofore referred to. The lower end of the stylus lever 32, has the forwardly projecting apertured lugs 40, to receive the stylus holder 41, which is pivotally held therein by means of the pivot pin 42. From the structure thus far

described, it will be seen that the stylus lever 32, is permitted to have a universal movement upon the bracket 17, within reasonable limits, while the tension spring 22, tilts the lower forward end of the lever 17, so as to cause the stylus to bear with a resilient pressure upon the record, as seen in Figs. 1 and 3. The throwing of either of the devices 26, or 27, into the forward position will carry the lever 32, and with it, the stylus free from the record. The stylus holder 41, is connected directly from its lower end with the diaphragm by means of the small wire link 43, and eye-stud 44, the latter passing through a small metal washer 45, an aperture in the center of the diaphragm and a second metal washer 46, the small end of the eye-stud being riveted outside the washer 46.

When the stylus is made to bear upon a record, the vibrations of the diaphragm 11, will be in exact unison with the recorded vibrations upon the record, and the resilient pressure of the stylus, due to the spring 22, will result in a much more perfect reproduction of the selection upon the record than has been hitherto possible with a sound box where such pressure is exerted through the medium of a floating weight. This, I attribute to the fact that the spring pressure is much more quickly responsive than weight pressure, for the reason that a weight possesses a certain inertia not easily nor readily overcome by the delicate excavations and elevations in the record groove. There is a certain time element in the movements of the weight which is entirely absent in the spring, the latter acting instantly. In some cases, however, in order to reproduce tones of comparatively low pitch and large volume, I find it advantageous to mount a small weight 47, upon the forward side of the lever 32, below its pivot bearing 38, as shown in Fig. 3. From its position, this weight has a tendency to relieve the spring 22, and as a result, relieve a part of the pressure of the stylus upon the record; but the main purpose is to add weight and consequent inertia to the parts immediately connected with the stylus, and this results in greater tone volume. The weight 47, is secured to the forward side of the lever 32, by any convenient means as by the screw 48, whereby it may be readily detached, when the sound box may be used for the general purposes as above described.

The stylus holder 41, is of peculiar construction and of a character to render it as light as possible consistent with the requisite strength. It is made of a light strip of sheet metal, blanked out as shown in Fig. 12, with the aperture 49, near its upper end and the pivot aperture 50, near its middle. The small nibs 51, are provided near its upper



end at equal distances above and below the aperture 49. The aperture 52, is located at the extreme lower end, to form a means of connection with the wire link 43, above referred to. The upper end of the blank is curled into tubular shape to receive the jewel stylus 53, and the nibs 51, are bent around to close the rear end of the tube thus formed, and thus prevent the stylus from being pushed through the tube under the pressure exerted upon it through the spring 22. The stylus is held in position within the tube by being forced therein, the elasticity of the metal being sufficient to grip the stylus, but in order to insure its permanency, I use a shellac cement, the aperture 49, being provided to permit of its being put within the tube without danger of smearing the point of the stylus. As a means of providing a broad bearing for the pivot pin 42, I secure upon each side of the holder 41, the two apertured bosses 54, with their apertures in alinement with the aperture 50.

In the modification illustrated in Figs. 4 and 15, I substitute for the stylus lever 32, and its support 31, heretofore described, the stylus lever 55, and the swivel stud 56. In this case, the stud 56, has at its forward end, the apertured and slotted enlargement 57, to receive the vertical part of the lever 55, and the stud is inserted through the apertures 23 and 24, of the bracket 17, as clearly shown in Fig. 4. The lower end of the lever 55 is offset a trifle as at 58 and provided with the forwardly extending, apertured lugs 59, to receive the stylus holder 41, in substantially the same manner as heretofore described in connection with the other forms of construction. The rear end of the lever 55, has a downward apertured extension 60, to bring the point of connection for the spring 22, into substantial alinement with the swivel stud 56, and it should be here stated that the stylus lever 32, is also provided with a similar downward extension 61, the purpose in each case being to have the spring 22, act in as direct a line upon the stylus lever as possible; in other words, the spring should exert its pull at right angles to the effective line of the lever.

From the constructions as above described, it will be seen that any lateral swaying of the stylus 53, as it travels over the record will be taken up by the lever support 31, or the swivel stud 56, and that the pull exerted by the link 43, upon the diaphragm 11, is always in a line perpendicular to the plane of the diaphragm. The parts are also constructed in such a manner as to secure improved results in sound definition not hitherto accomplished in sound boxes of this type, while the structures are materially simplified by the use of sheet metal pressed

into shape or cut out into blanks and afterward bent or pressed into the desired forms. The cheapness of construction has also been kept in view, so that no unnecessary labor or material is used.

I claim:

1. In a sound box, the combination of a box body, a diaphragm within said body, designed when in use to lie in a vertical plane, a supporting bracket rigidly secured to said box body, an overhanging horizontal arm upon said bracket, a stylus lever, a universal joint connection between said lever and said arm, said lever having a substantially vertical arm extending toward the center of said box, and a substantially horizontal arm, a spiral spring connecting the horizontal arm of said lever to a part of said bracket and a stylus holder pivotally connected to the extremity of the vertical arm of said lever and to the center of the diaphragm.

2. In a sound box, the combination of a box body, a diaphragm within said body, designed when in use to lie in a vertical plane, a supporting bracket rigidly secured to said box body, an overhanging horizontal arm upon said bracket, a stylus lever, a universal joint connection between said lever and said arm, said lever having a substantially vertical arm extending toward the center of said box, and a substantially horizontal arm, a spiral spring connecting the horizontal arm of said lever to a part of said bracket, a stylus holder pivotally connected to the extremity of the vertical arm of said lever and to the center of the diaphragm, and a shifting device mounted upon said bracket for shifting said lever and holder out of operative position.

3. In a phonograph sound box, the combination of a box body, a diaphragm secured in said box body, said diaphragm normally lying in a vertical plane, a bracket rigidly secured to said body, said bracket being provided with an overhanging horizontal arm, a support pivotally mounted upon said overhanging arm, a stylus lever pivotally secured to said pivoted support to form a universal connection between said stylus lever and said overhanging arm, means for resiliently holding said lever in its normal position, and a weight secured to said stylus lever for relieving the effect of said resilient holding means.

4. In a phonograph sound box, the combination of a box body, a diaphragm secured within said box body, and designed when in use to lie normally in a vertical plane, a vertical supporting bracket rigidly secured to said box body, a horizontal arm and a horizontal extension upon said bracket, a stylus lever having a horizontal and a vertical arm, a universal joint connection between said stylus lever and the horizontal arm of

said bracket, a stylus holder pivotally secured to the vertical arm of said lever, a link connection between said holder and said diaphragm, a tension spring connecting the  
5 horizontal arm of said lever with the extension on said bracket and a weight secured to the vertical arm of said lever for acting in opposition to the tension of said spring.

PLINY CATUCCI.

Witnesses:

L. M. SANDERS,

W. F. FRIEDD.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

---





P. CATUCCI.  
PHONOGRAPH.

APPLICATION FILED MAY 29, 1911.

1,085,849.

Patented Feb. 3, 1914.

3 SHEETS—SHEET 1.

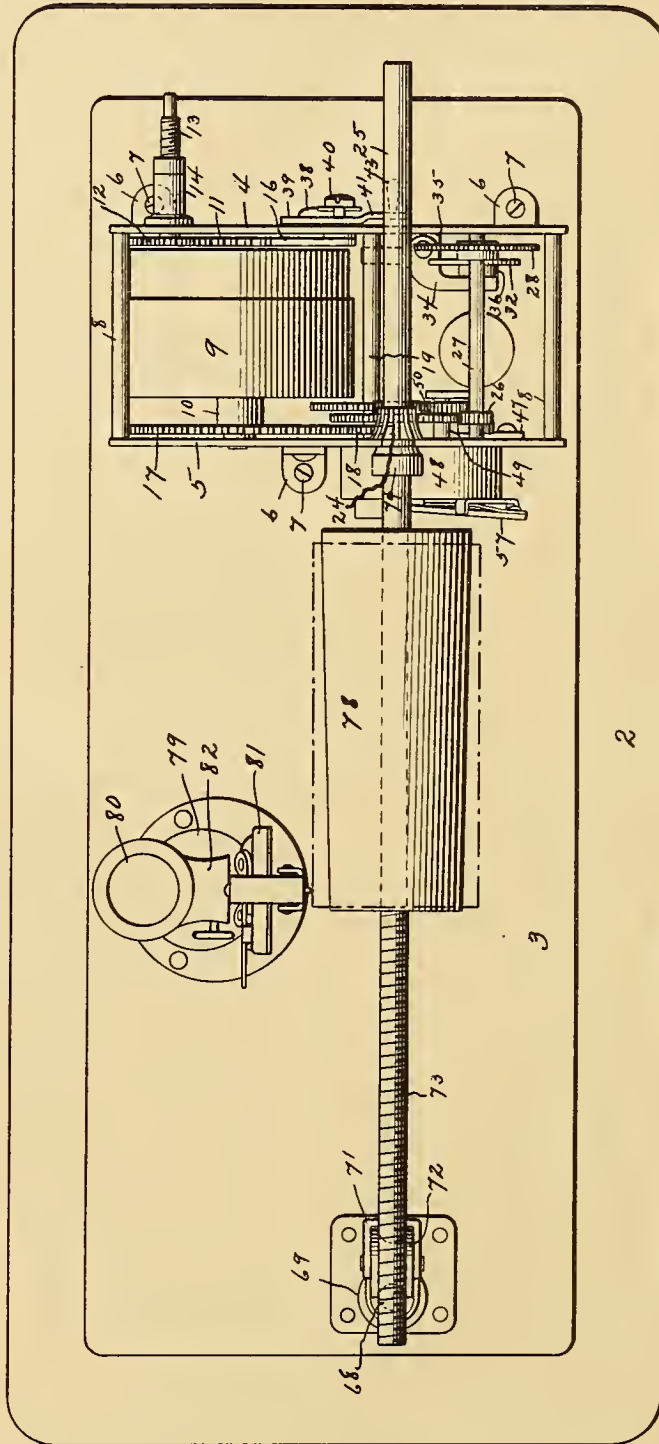


Fig. 1.

Witnesses:  
H. Baldwin  
J. Scott MacNeil

Pliny Catucci Inventor  
By his Attorney, M. Sanders



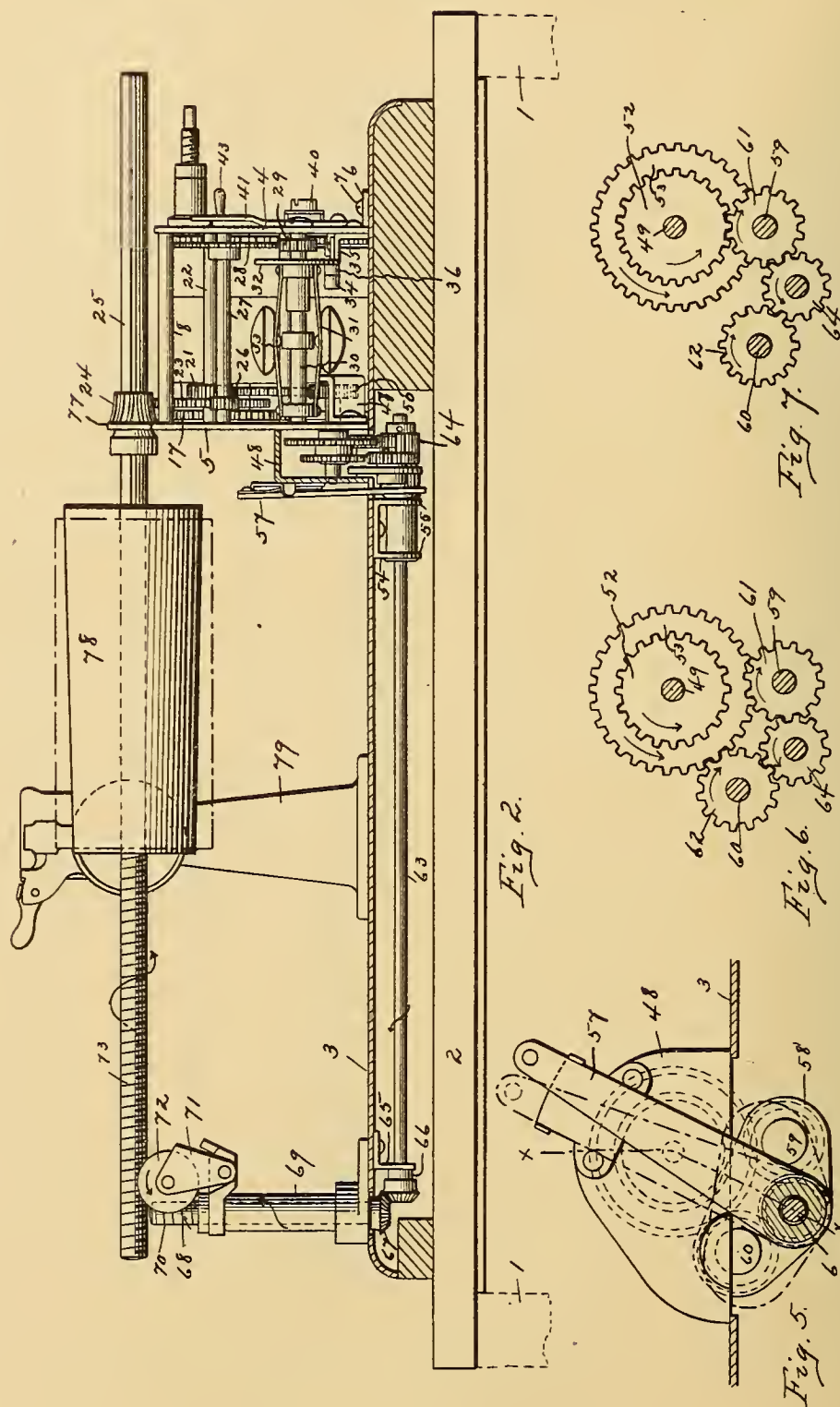


P. CATUCCI.  
 PHONOGRAPH.  
 APPLICATION FILED MAY 29, 1911.

1,085,849.

Patented Feb. 3, 1914.

3 SHEETS-SHEET 2.



Witnesses:  
 H. Baldwin  
 J. Scott MacNutt.

Pliny Catucci Inventor  
 By *Louis M. Sanders*  
 Attorney



P. CATUCCI.

PHONOGRAPH.

APPLICATION FILED MAY 29, 1911.

1,085,849.

Patented Feb. 3, 1914.

3 SHEETS—SHEET 3.

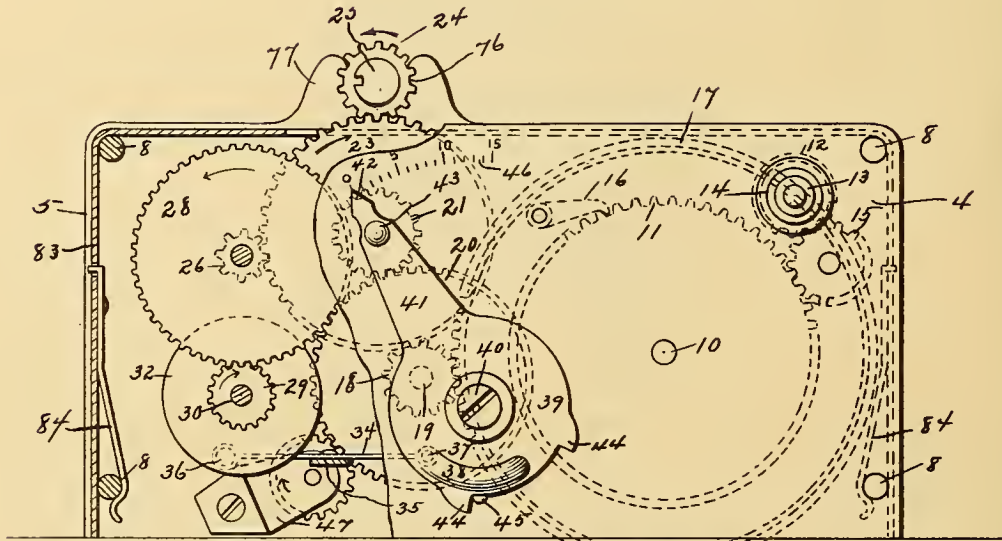


Fig. 3

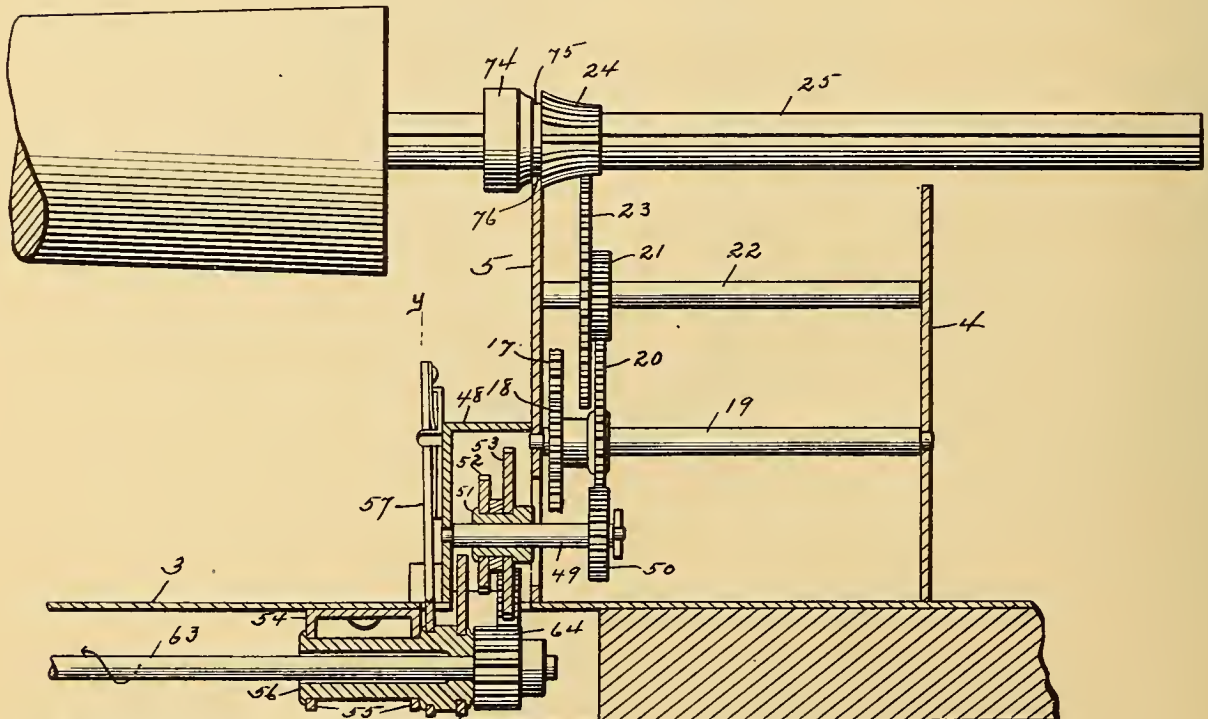


Fig. 4

Witnesses:  
H. Baldwin  
J. Scott MacNutt

Pliny Catucci Inventor  
By his Attorney  
Louis M. Sanders



# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,085,849.

Specification of Letters Patent.

Patented Feb. 3, 1914.

Application filed May 29, 1911. Serial No. 630,170.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make, construct, and use the same.

The principal object of my invention is to so improve the construction of a phonograph as to materially increase its efficiency as a device for the reproduction of musical and other sounds, but also to reduce its cost of manufacturing to the lowest possible point, consistent with good material and workmanship.

In the development of the phonograph art it has been found that there is an increased demand for what is called the four minute cylindrical record. The two minute record—that is, a record that requires a period of two minutes to reproduce the entire matter placed thereon—has necessitated the use of a feed screw having 100 threads to the inch. The extreme fineness of this thread has laid it open to the objection that, in use, the thread was easily marred or damaged by coming in contact with other hard substances, and thereby, the delicacy and efficiency of this machine was very much impaired. If the pitch of the thread was decreased to, say fifty to the inch, the thread would be materially strengthened and much more capable of withstanding the hard usage to which such an instrument is usually put. Such a reduction in the pitch of the thread would correspondingly reduce the length of time occupied in reproducing the matter upon the cylindrical phonograph records.

By the former methods of construction, if a four minute record was desired, it was necessary to correspondingly increase the number of threads on the feed screw to 200 to the inch. It will be readily seen that a feed screw of this extreme fineness would be too delicate for the practical application of the phonograph to ordinary use.

By my improvement, I am enabled, not

only to reduce the number of threads upon the feed screw to fifty to the inch, and thereby correspondingly increase their strength and resistance to ordinary rough usage, but other features of the improvement enable me to utilize both the two minute and four minute records.

The following is a full description of the means I employ to carry out the various objects of my invention.

Figure 1 is a plan view of my improvement with the cover for the motor removed to disclose the interior. Fig. 2 is a side elevation partly in section of the completed structure. Fig. 3 is an end elevation partly in section of the motor, and its governing mechanism. Fig. 4 is a sectional view on line X, X, of Fig. 5. Fig. 5 is a vertical view on line Y, Y, of Fig. 4. Fig. 6 is a diagrammatic section of the subtramental gear train for reproducing two minute records. Fig. 7 is a similar view showing the gear shifted to reproduce the four minute records. Figs. 6 and 7 are taken in substantially the same positions as represented in Fig. 5, in the full line and dotted line positions of the shifting lever 57.

Similar letters of reference refer to like parts throughout the specification and drawing.

In the drawings, 1, represents the containing case which is provided with a cover 2, on the underside of which is rigidly secured the base 3, in such manner that when such cover is lifted off the case and inverted, it may rest upon the case with the operating mechanism exposed as shown in Fig. 2. All of the working parts of the machine are mounted upon the base 3 as shown.

The motor for driving the phonograph mandrel is constructed in the following manner: Upon the base 3, are the two upright plates 4 and 5, rigidly secured to the base 3 by means of the lugs 6, and screws 7. The upright plates 4 and 5 are spaced apart by the spacing rods 8, located in the corners of the plates as shown. These two upright plates 4 and 5 serve as bearing supports for the pivots of the various gear

wheels and parts which form the motor structure. The main driving spring is contained in the spring box 9, which is mounted upon a shaft 10. Upon one end of this shaft and rigidly secured thereto is the winding gear 11, which is driven through a gear 12, mounted upon the inner end of a stub shaft 13, the latter being carried in an extension arm 11. An ordinary crank secured upon the outer end of the stub shaft is utilized for winding up the spring in the spring box 9, its motion being communicated through the gear 12, and an idler gear 15, as clearly illustrated in Fig. 3. In order to retain the spring in its wound up condition, I provide an ordinary pawl 16, which engages the teeth of the gear wheel 11. At the opposite end of the shaft 10 is rigidly mounted a gear wheel 17, which meshes with a small pinion 18, mounted upon a shaft 19, mounted in the side plates 4 and 5.

Rigidly secured to the shaft 19, is a gear 20 meshing with a pinion 21 on the shaft 22. Also mounted upon the shaft 22, is a large gear wheel 23, the latter meshing with a pinion 24, upon the feed shaft 25. The gear wheel 23 also meshes with a pinion 26 upon the shaft 27, and through the gear wheel 28, and pinion 29, leads down to the governor shaft 30. The governor 31, upon shaft 30 is of a usual spring and weight type, having the disk 32, weights and supporting springs 33, as is well-known in governors of this kind. The regulating lever 34, for the governor is pivoted upon the bracket 35, and has at one end a friction brake 36, to bear upon the friction disk 32. The opposite end of this lever is provided with a pin 37, projecting through the side plate 4, into engagement with the snail cam 38, upon the disk 39, the latter being pivoted to the side plate 4, by means of a screw 40. The disk 39, is provided with an extension arm 41, pointer 42, and handle 43. Stops 44 are also provided upon the disk 39, to engage with the stop pin 45, whereby the limit of the throw of the disk and consequently of the snail cam 38, is effected. This snail cam 38, consists of an inclined depression in the side of the disk 39, such depression being concentric with the center of the disk. It will thus be seen that oscillation of the disk 39, will cause the snail cam 38, to engage the pin 37, and thereby oscillate the lever 34, so that its opposite brake end 36, will be pressed down upon the disk 32, or be withdrawn therefrom, thereby permitting the disk 32 to slide along the governor shaft 30, under the centrifugal action of the governor weighted spring 33. This operation is well-known to those skilled in the art, and needs no further description. The upper or index end 42 of the arm 41

oscillates along the scale 46, so that the speed of the motor may be regulated accordingly.

Mounted in the bracket 47, and a box 48, outside of the plate 5, is short shaft 49, carrying the gear 50, which meshes with the gear 20, and is driven thereby. Rigidly secured also to the shaft 49, and outside of the plate 5, is the sleeve 51, said sleeve carrying two spaced gear wheels 52 and 53, the diameters of the latter being in the ratio of two to three. Secured beneath the base 3, and adjacent to the box 48, is the bracket 54, with downwardly extending apertured arms 55, within which is the pivotally mounted sleeve 56. This sleeve extends outside of the lever 57, which projects upward through the base 3, and serves as an operating arm for oscillating the sleeve 56, for a purpose hereinafter to be described. Also rigidly secured upon the sleeve 56, is a plate 58, which carries the short stub shafts 59 and 60, upon which are mounted the two pinions 61 and 62, the latter being staggered, and arranged to mesh respectively with the two gear wheels 52 and 53 on the shaft 49, as the lever 57, is oscillated either forward or back.

Carried in the sleeve 56, such sleeve forming a bearing, therefor, is the long shaft 63, such shaft carrying at its outer end a pinion 64, rigidly mounted thereon, and in constant engagement with each of the gear wheels 61 and 62. From this construction it will be seen that as the plate 58 is oscillated in one direction, the gear wheel 61 will be brought into engagement with the gear wheel 52, and when oscillated in the opposite direction, the gear wheel 62, will be brought into engagement with the gear wheel 53. And inasmuch as the motion of the shaft 49, is communicated through the gear wheels 52 or 53, to the gear wheels 61 or 62, the motion of the shaft 49, will be communicated to the shaft 63 through the gear 64, and the speed of the shaft 63 will be varied accordingly. The opposite end of the shaft 63 is carried in a bearing bracket 65, beneath the base 3, and has rigidly secured at its outer end, a miter gear 66, the latter meshing with the miter gear 67 at the lower end of an upright shaft 68, the latter being carried in the bearing bracket 69 as clearly illustrated. The upper end of the shaft 68, is provided with a screw thread 70, which in practice has 50 threads to the inch. Mounted also upon the upper end of the bracket 69, is a swiveled bearing 71, carrying at its upper end a worm 72, which is normally in mesh with the thread 70 on the shaft 68. This worm 72, serves the purpose of supporting the feed shaft 25, the outer end of which is threaded as at 73, with fifty threads to the inch.



As above described, the pinion 24, meshes with the gear 23, and is mounted upon the feed screw 25. It should also be stated that such pinion is splined to said feed screws so that the rotation of the pinion 24, will cause the rotation of the feed shaft 25. This pinion 24, is provided with a collar 74, and groove 75, said groove being for the purpose of engaging a semi-circular notch 76, formed in an upward extension 77, of the plate 5, so that if the pinion 24, is rotated, the feed shaft 25, may slide through, without in any way shifting such pinion. The feed shaft 25, carries the usual mandrel 78, upon which the usual phonograph record is placed.

The numbers of teeth in the gears and pinions in the main gear train are such as to give the ratio of the rates of revolution of the pinions 24 and 50 as 3 to 1; that is the pinion 24 makes three (3) revolutions to one (1) revolution of the pinion 50.

Secured to the base 3, and back of the mandrel 78 is the upright horn and sound box support 79. I have not illustrated the horn in connection with the support, as it will be readily understood that the small bent end of the horn is simply inserted into the upper aperture 80 of the horn support, and that the sound box 81, is secured in the lateral tubular opening, 82, of this support, so as to bring the stylus of the sound box against the surface of the cylinder record, mounted upon the mandrel 78.

The operation of the device is as follows: It is understood that the spring within the spring box is wound up, and that a record is put upon the mandrel 78. If now, the record is a four minute record, the operator will shift the lever 57 into position to bring gear 62 into engagement with the large gear wheel 52 on the shaft 48, then operating the arm 41 of the governor control, the motor is started, and it will cause the rotation of the feed shaft 25, and inasmuch as the screw thread 73 of such feed shaft engages with the worm 72, such feed shaft will be driven longitudinally to cause the record and mandrel to travel transversely of the sound box, but with the four minute record the record groove will be 200 to the inch, while the threads 73 are 50 to the inch. This, however, would cause the mandrel to travel laterally four times as fast as required, were it not for the fact that the worm 72 is also in engagement with the threads 70 of the shaft 68. Now, since the shaft 68 is rotated in a direction to cause the rotation of the worm wheel 72, in the direction of the arrow, the result is, lateral motion of the feed shaft 25, and mandrel 78, is one fourth of what it would be if such mandrel and feed shaft were to travel under the influence of the threads 73 alone, thereby giving the

mandrel a travel equivalent to what would be under the influence of a thread 200 to the inch.

When the small wheel 53 is utilized as the driving mechanism for the shaft 63 through the gear wheels 61, the shaft 63, will travel with decreased speed, and with the result that the decrease of speed is communicated to the worm 72, through the connecting rotating parts, with the result that the lateral traveling of the feed shaft and its mandrel will be reduced to what it would be under the influence of a thread 100 to the inch.

It will thus be seen that with my improved structure I am able by the mere shifting of the lever 57, to accordingly shift the mechanism, to operate with either two minute records where the record grooves are 100 to the inch, or with four minute records where the record grooves are 200 to the inch, the whole being accomplished by means of the differential screw feed mechanism embodied in the screw thread upon the mandrel shaft. It will be noted that the mandrel rotates in the direction of the arrow thereon, and this would cause a motion of translation in the mandrel shaft in the direction of the arrow, but since the vertical shaft 68 rotates in the direction of the arrow thereon, and meshes with the worm wheel 72, causing a simultaneous rotation of said worm wheel in the direction of the arrow thereon, the resultant is, a reduction of the motion of translation of the mandrel shaft, and amount of this reduction depends upon which of the differential change gears 61 or 62 is in engagement with the gears 52 or 53.

As a means for protecting the motor from dust and dirt I provide a cover 83, which is located over the space bars or rods 8, as clearly shown in Fig. 3. This cover is held in position by the snap spring 84, which takes over the lower space bars 8, as shown. I also provide a slot in the upper portion of this cover, so that the gear wheel 23 may project through such slot into engagement with the pinion 24, on the mandrel shaft 25.

When it is desired to place a record upon the mandrel 78, it is only necessary to lift said mandrel with its said feed screw free from semi-circular notch 76, and the worm wheel 72, when the record may be slipped over the mandrel and the mandrel together with its shaft replaced in position with the grooves 75 within the notch 76.

When the phonograph is not in use, the mandrel shaft may be removed from its position, and placed within the case, after which the cover, 2, may be reversed and placed upon the case, so as to completely inclose all of the working parts of the phonograph.

I do not limit to the phonograph my claims to the differential screw feed struc-



ture, as such a device is capable of use in other relations. I desire, therefore, to claim this feature broadly as well as in combination with the phonograph motor.

5 I claim:

1. In a phonograph the combination of a pair of screw threaded shafts, a record mandrel rigidly mounted upon one of said shafts, gear connections between said shafts for  
10 producing simultaneous rotation thereof and a worm wheel in normal engagement with the threads of said shafts for producing a motion of translation of said mandrel shaft in the direction of its axis.

15 2. In a phonograph, the combination of a pair of screw threaded shafts, a record mandrel rigidly mounted upon one of said shafts, a gear connection between and for simultaneously rotating said shafts, and a worm  
20 gear engaging the threads of said shafts for producing a motion of translation of said mandrel shaft in the direction of its axis.

3. In a phonograph, the combination of a pair of worm threaded shafts, a record mandrel mounted upon one of said shafts, a worm wheel engaging the screw-threads of  
25 said shafts, and a spur gear connection between said shafts for producing rotation thereof and in conjunction with said worm wheel a longitudinal motion of said record  
30 mandrel shaft.

4. In a phonograph, the combination of a pair of angularly disposed screw-threaded shafts, one of which carries a record mandrel, a worm wheel engaging the screw  
35 threads of said shafts, and intermeshing change gears connecting said shafts, for producing a simultaneous rotation thereof and longitudinal motion of said record mandrel shaft.

5. In a phonograph, the combination of a pair of angularly disposed screw-threaded shafts, one of which carries a record mandrel, a worm wheel meshing with the threads  
45 of both of said shafts, a gear wheel splined to said record mandrel shaft, and intermeshing change gears connecting said gear wheel with the other shaft, whereby the rotation of said gears will produce a simultaneous rotation and longitudinal translation  
50 of said record mandrel shaft.

6. In a phonograph, the combination of a pair of angularly disposed screw threaded shafts, a worm wheel normally in constant  
55 engagement with the threads of said shafts, a record mandrel mounted upon one of said shafts, and means for producing simultaneous rotation of both of said shafts at different relative rates and a consequent longitudinal translation of said mandrel shaft.

7. In a phonograph, the combination of a screw threaded mandrel shaft, and a supplemental screw threaded shaft, a worm  
60 wheel engaging the threads of both of said

shafts, and change gear connections between  
65 said shafts for producing simultaneous rotation thereof and a longitudinal feeding motion of said mandrel shaft.

8. In a phonograph, the combination of a record mandrel shaft, having screw threads  
70 thereon, a second screw threaded shaft angularly disposed with respect to said mandrel shaft, a worm wheel meshing with the threads of both of said shafts, a gear wheel splined to said record mandrel shaft, a gear train  
75 connecting said gear wheel to said second shaft, and a motor for driving said gear train and rotating said shafts at different relative rates, whereby said mandrel shaft will also have a feeding motion in the di-  
80 rection of its axis.

9. In a phonograph, the combination of a motor gear train, a record mandrel shaft, a screw thread of comparatively low pitch upon said shaft, a pinion splined to said  
85 shaft and in operative engagement with a gear of said train to rotate said shaft, a supplemental gear train driven from said motor gear train, a screw threaded shaft driven by said supplemental gear train and a worm  
90 wheel engaging the threads of said shafts, said worm wheel being driven from said supplemental gear train in a direction to reduce the progressive feeding motion of said mandrel shaft due to the low pitch of  
95 the thread thereon.

10. In a phonograph, the combination of a motor gear train, a screw threaded record mandrel shaft rotated by said gear train, a supplemental gear train driven by said  
100 motor gear train, a supplemental screw threaded shaft driven by said supplemental gear train, a worm wheel meshing with the threads of both of said shafts and driven by said supplemental shaft to give said mandrel shaft a feeding motion in the direction  
105 of its length, and change gears in said supplemental train whereby the relative rates of feed of said shaft may be changed.

11. In a phonograph, the combination of  
110 a motor gear train, a screw-threaded mandrel shaft, a pinion splined to said shaft and in engagement with a gear wheel of said train to be rotated thereby, a supplemental gear train including a screw-threaded  
115 shaft driven by said motor gear train, a worm wheel meshing with the threads of said shaft respectively and driven by said second named shaft to give said mandrel shaft a feeding motion in the direction of its  
120 length, and change gears in said supplemental gear train whereby the relative rates of feed of said mandrel shaft may be changed.

12. In a phonograph, the combination of a motor gear train, a record mandrel shaft,  
125 a screw thread of comparatively low pitch upon said shaft, a pinion splined to said shaft and in operative engagement with a

gear of said train to rotate said shaft, a supplemental gear train including a screw threaded shaft driven from said motor gear train, a worm wheel engaging the threads  
5 of both of said shafts, said worm wheel being driven from said supplemental gear train in a direction to reduce the progressive feeding motion of said shaft due to low  
pitch of the thread thereon, and change gears in said supplemental train whereby the relative rates of feed of said mandrel shaft may  
10 be changed.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,  
J. SCOTT MAC NUTT.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

---





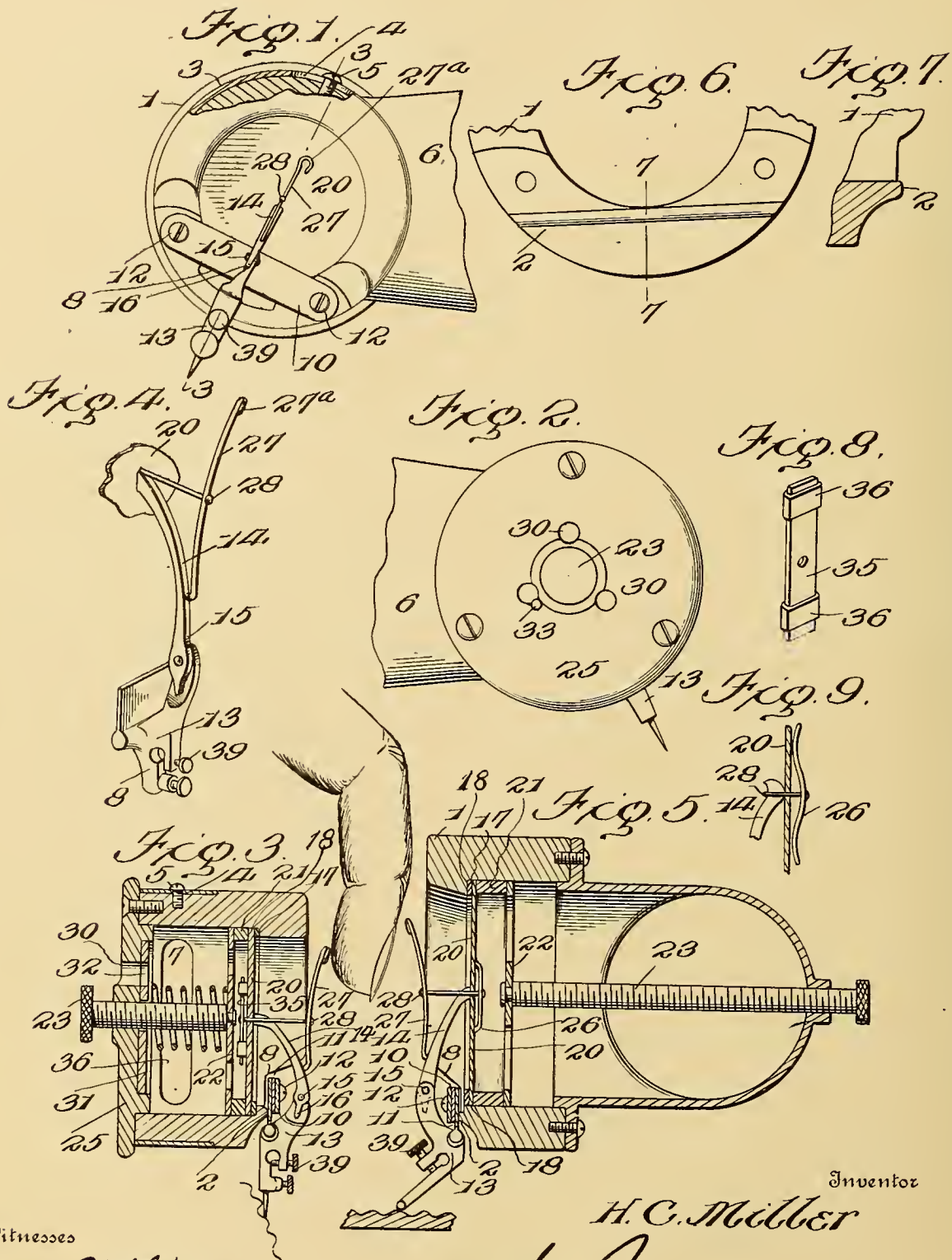


H. C. MILLER.  
SOUND BOX.

APPLICATION FILED DEC. 23, 1908.

1,087,035.

Patented Feb. 10, 1914.



Witnesses

Ray Williams  
J. S. Menden

Inventor

H. C. Miller

J. M. Miller

Attorney

# UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

## SOUND-BOX.

1,087,035.

Specification of Letters Patent.

Patented Feb. 10, 1914.

Application filed December 23, 1908. Serial No. 468,980.

*To all whom it may concern:*

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in sound boxes for talking machines.

The object of the invention is to provide a "fret" held spring plate fulcrum, a pad acting the same as finger pressure over the fret to give a certain note, as in the case of an instrument such as a mandolin or guitar.

A further object of the invention is to provide a self adjusting means on the stylus lever to permit the latter to be in yielding contact with the diaphragm, irrespective of the adjustment of the fulcrum, also to recompense for the dishing of the diaphragm by an adjustable modifying element and its actuating means.

The invention also relates to the details of construction and arrangement of parts, to be hereinafter referred to and to be particularly pointed out in the claims.

In the drawing Figure 1 is a side elevation of my improved sound box. Fig. 2, is a view looking from the opposite side. Fig. 3, is a transverse section on the line 3—3 Fig. 1. Fig. 4, is a detail perspective view of the stylus lever. Fig. 5, is a transverse section showing the adaptation of the invention when used in connection with a record having vertical indentations in its groove. Fig. 6, is a detail front elevation of the front of the casing to bring out clearly the formation of the fret. Fig. 7, is a detail section on line 7—7 Fig. 6. Fig. 8, is a detail perspective view of one form of modifying element. Fig. 9, is a detail view of a further modified form of modifying element.

1, designates the casing having a portion of one face slightly cut away, and adjacent thereto is formed a fret 2. Surrounding the sound box casing is a collar 3, formed with a slot 4, through which passes a set screw 5. The collar 3, is integral with the horn 6, which communicates with the casing 1, through a slot 7. This construction permits of the adjustment of the sound box with reference to the horn, so that the stylus can be

set at different angles to cooperate with the record.

55

Resting on the fret 2, is a thin flat spring plate 8, clamped to the sound box by means of a bar 10, with an interposed piece of felt or like material, forming a pad 11. The bar 10, is held in position by means of screws 12. The flat spring 8, has attached to it the stylus lever which is preferably formed in two sections 13, and 14. The upper section 14 is hinged to the lower section 13, as indicated at 15, and the said upper section is provided with an extension 16, projecting beyond the pivotal point 15, and is bent toward the lower section to act in the nature of a spring contact, the friction between the two sections being sufficient to communicate, or carry the vibration from the lower section, which carries the stylus, through the upper section to the sound box. The free end of the upper section 14, contacts with the diaphragm, and by releasing the screw 12, the stylus lever as a whole may be adjusted as may be desired while the hinge connection between said sections insures perfect contact with the center of said diaphragm.

80

The casing 1, is provided with a seat 17, with a washer 18, against which the diaphragm 20, rests. Against the diaphragm is a resilient washer 21, and in contact with the washer is a spider 22, connected by a screw 23, passing through a threaded opening 24, in the rear plate 25. The hinged stylus lever allows the stylus to adjust itself when the diaphragm is pressed more or less toward it, when the washers 13, and 21, are operated upon by the spider. It must be understood that the spring plate 8, must always be in normal condition, or in other words without strain in either direction, otherwise when the vibrations are transferred to the diaphragm they will be imperfect. Furthermore the diaphragm is better adapted to perform its mission if the stylus lever does not control it as a one piece one would do, when the different adjustments are given to the diaphragm.

100

On the inner side of the diaphragm and opposite the point of contact of the stylus lever therewith, is a modifying element 26, connected to a spring 27, on the upper section 14, of the stylus lever, the said spring

105



being connected to the modifying element by means of a flexible connection 28. This connection has a tendency to draw the upper section 14, toward the diaphragm on one side, and the modifying element toward the opposite side of said diaphragm, making an elastic but perfect contact. The flexible element passes freely through an opening in the center of the diaphragm adjacent the point of contact of the stylus lever therewith. This construction is what I term an automatic recompensing device, for under all circumstances it maintains a uniform pressure of the upper section of the stylus lever on the diaphragm. The spring 27, is extended as shown at 27<sup>a</sup>, and performs an additional function in that it may be used as a means for modifying the tone of the diaphragm by pressing it forward, as indicated in Fig. 3. By pressing slightly on the spring the operator may change the tone quality of the diaphragm with perfect safety and without harm to the record or the stylus, inasmuch as the hinged connection between the sections will permit of movement of the upper section which contacts with the diaphragm, while the lower section will remain in its normal condition, in contact with the record.

The rear plate 25, of the casing is formed with a series of openings 30, and mounted on the screw 23, is a plate 31, formed with a series of openings 32, designed to be brought into register with the openings 30; a finger piece 33, projecting through one of the openings in the rear plate that the operator may conveniently adjust the damper. A spring 34, is interposed between the spider 22, and the damper 31, to hold the latter tightly against the rear plate, as will be understood by reference to the drawing. By adjusting the damper it will allow of a certain volume of sound to pass directly to the atmosphere, without amplification of said sound which would otherwise occur if the whole volume of sound were to be passed through the horn.

In Fig. 8, I have shown one form of modifying element 26, the same consisting of a thin plate 35, formed with an opening for the passage of the flexible element to secure it in place, and provided with two adjustable contacts 36. The contacts 36, are preferably in the form of sections of rubber tubing or other elastic material, and are slipped on the plate 35, and are adapted to be moved toward or away from the center to tune the diaphragm. It is well known in this art that the more of the center of the diaphragm which can be held substantially rigid and vibrated, the lower the pitch of the sound produced will be. On the other hand the smaller the portion of the center of the diaphragm so held, the tendency is to cause the sound reproduced to be of

higher pitch. In other words the diaphragm should be tuned to give it the proper pitch and inflection for the production of natural musical qualities whether vocal or instrumental. The lower section 13, of the stylus lever is bifurcated and a set screw 39, passes through one of the arms and bears on the other to provide an adjustment to obtain more or less "tense" sound, used in giving demonstrations for word effect, that is, to bring out certain words more or less perfectly as the case might be.

In Fig. 5, I have shown a different form of modifying element which in itself is not adjustable, but may be used after testing the diaphragm by an adjustable element such as shown in Fig. 8. However, I do not desire to limit myself to the exact form of modifying element as it may be made resilient as shown in Fig. 9, in which event the stylus lever will be held against the diaphragm in a manner substantially as shown in Fig. 4.

Referring now particularly to Figs. 3, 6, and 7, it will be noted that the fret 2, is in the nature of a rib, formed on the casing by cutting away a portion of the latter, and resting directly on the fret is the spring plate or fulcrum for the stylus lever. The fret is in alinement with the lower edge of the cross bar 10, and as previously stated a pad is interposed between said bar and plate to form a perfect contact with a limited part or portion of the spring plate, which may be regulated according to the pressure of the spring, and adjusted to produce perfect reproduction.

While I have described what I regard as the preferable manner of carrying out my invention, I desire it to be distinctly understood that the various features may be changed without departing from the spirit and scope of my invention. For instance the diaphragm may be used without the modifying element or the damper, and the modifying result obtained by the extension of the spring 27. Or, the lower adjustment of the stylus lever may be used to strengthen or weaken the sound transmission.

In making a record the diaphragm acting on the upper section causes the latter to vibrate, the said vibrations being transferred by the frictional contact 16, to the lower section as will be readily understood.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A sound box, comprising a casing, a diaphragm, means supporting the diaphragm in the casing, a stylus lever yieldingly connected to the casing and in contact with the diaphragm, a spring carried by the stylus lever, and a connection between the spring and the diaphragm.

2. A sound box, comprising a casing, a



diaphragm, means supporting the diaphragm in the casing, a stylus lever yieldingly connected to the casing and in contact with the diaphragm, a spring carried by the stylus lever, a modifying element bearing against the diaphragm, and a connection between the spring and the modifying element.

3. A sound box, comprising a casing, a diaphragm, a stylus lever in contact with the diaphragm, a spring element supported by the stylus lever, said spring element having an extension to form a finger piece and a flexible connection between the spring element and the diaphragm.

4. A sound box, comprising a casing, a diaphragm, a stylus lever contacting with the diaphragm, a spring element connected to the diaphragm, and supported by and extending from the stylus lever.

5. A sound box, comprising a casing, a diaphragm, a stylus lever normally in contact with the diaphragm, a modifying element in contact with the diaphragm, and resilient means interposed between the modifying element and the stylus lever.

6. A sound box, comprising a casing, a diaphragm, a radially disposed resilient support extending from the casing and carrying a stylus lever, an element clamping the resilient support to the sound box, a padded element interposed between the clamping element and the resilient support, and means for holding the stylus lever in contact with the diaphragm.

7. A sound box, comprising a casing, a diaphragm, a stylus lever normally in contact with the diaphragm, a spring supported by the stylus lever, and a flexible connection interposed between the spring and the diaphragm.

8. A sound box, comprising a casing, a diaphragm, a stylus lever, resilient means supporting the stylus lever, a bar clamping the resilient connection to the casing, a modifying element in contact with the diaphragm, a spring supported by the stylus lever, and a flexible connection between the spring and the modifying element.

9. A sound box, comprising a casing provided with a fret, a diaphragm, a stylus lever, a radially disposed resilient connection intermediate the casing and the stylus lever and bearing on the fret, and means for holding the stylus lever in contact with the diaphragm.

10. A sound box, comprising a casing, a diaphragm, a support, a stylus lever mounted on the support and having its end in contact with the diaphragm and formed with a slot below its support to provide a resilient member, and a screw for increasing or decreasing the tension of said member.

11. A sound box, comprising a casing, a diaphragm, a stylus lever mounted on the

casing, and in contact with the diaphragm, a spider within the casing, means for moving the spider to regulate the tone of the diaphragm, an atmosphere damper in the casing, and a spring interposed between the spider and damper.

12. A sound box, comprising a casing having a rear wall, formed with openings, a diaphragm, a stylus lever, a damper bearing against the rear wall and formed with openings and adapted to register with the openings in the casing, a yielding device for compressing the damper against the rear wall and a horn in communication with the casing.

13. A sound box, comprising a casing, a diaphragm supported in a seat in the casing, a stylus lever, a spring mounted on the stylus lever, a flexible connection interposed between the diaphragm and the spring, and means for regulating the pressure of the diaphragm on its seat.

14. A sound box, comprising a casing, a diaphragm, a stylus lever in contact with the diaphragm, a spider in the casing, a screw connected with the spider, a damper in the casing, and a spring interposed between the spider and the damper.

15. A sound box, comprising a casing, having a fret, a stylus lever having a spring fulcrum, including a spring plate, and a padded bar, said bar being parallel with the fret and clamping the spring plate to said fret.

16. A sound box, comprising a casing, a diaphragm, a stylus lever yieldingly connected to the casing so the upper end will move in the direction of the flexing movement of the diaphragm, said stylus lever consisting of two parts hinged together, above the yielding connection so that each section may move independently in the direction of the flexing movement of the diaphragm, and means for yieldingly holding the free end of the stylus lever in contact with the diaphragm.

17. A sound box, comprising a casing, a diaphragm, a stylus lever, a yielding connection extending radially from the casing and to which the stylus lever is secured, said stylus lever consisting of two parts hinged together, and means for frictionally holding the two parts in contact with each other.

18. A sound box, comprising a casing, a diaphragm, a stylus lever made in sections, means for holding said sections in frictional engagement with each other, a yielding connection for holding the upper one of said sections in contact with the diaphragm, and means for resiliently supporting one of the sections on the casing.

19. A sound box, comprising a casing, a diaphragm, a stylus lever formed in sections, means whereby the stylus lever may

be vertically adjusted, a spring on the upper lever section, and a flexible connection between the stylus lever and the diaphragm the spring holding the upper section of the stylus lever in contact with the diaphragm.

20. A sound box, comprising a casing, a diaphragm adjustably mounted in the casing, means for adjusting the diaphragm, a sectional stylus lever, a spring fulcrum therefor, and means on the stylus lever for holding it in yielding contact with the diaphragm.

21. A sound box, comprising a casing, a diaphragm, a stylus lever, a modifying element in contact with but disconnected from one face of the diaphragm, and means on the opposite side of the diaphragm for yieldingly holding the modifying element in contact with the diaphragm.

22. A sound box, comprising a casing, a diaphragm, a stylus lever, a modifying element loosely held in contact with one face of the diaphragm, and a connection interposed between the stylus lever and the modifying element to hold said modifying element and stylus lever in yielding contact with the diaphragm.

23. A sound box, comprising a diaphragm, a stylus lever, a vertically mounted spring plate forming a fulcrum for the stylus lever and sustaining the weight of the sound box, means permitting adjustment of the spring-plate toward and from the center of the diaphragm, and means for yieldingly holding the free end of the stylus lever in contact with the diaphragm.

24. A sound box, comprising a casing, having a fret, a diaphragm, a stylus lever, a vertically mounted spring fulcrum plate

fastened to the stylus lever, and means including a padded bar to permit of adjustment of the spring fulcrum plate vertically and laterally.

25. A sound box, comprising a casing, a diaphragm, a stylus lever resiliently fulcrumed to the casing, and means including a plate and a pad between the plate and casing for changing the conductivity of the stylus lever.

26. A sound box, comprising a casing, a diaphragm, a stylus lever mounted on the casing, and automatic recompensing means on the stylus lever including a flexible connection for holding the stylus lever in contact with the diaphragm.

27. A sound box, comprising a casing, a diaphragm, a spring fulcrumed stylus lever formed in two sections hinged together and frictionally held in contact with each other, and means on the diaphragm and the upper end of the stylus lever to hold said stylus lever and the diaphragm in frictional contact.

28. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus lever, a fulcrum extending radially from the casing to support the stylus lever, the stylus lever comprising two sections connected together by a frictional joint above the plane of the fulcrum, and flexible means connecting the upper section of the stylus bar and the diaphragm.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY C. MILLER.

Witnesses:

WM. F. PALMER,  
GERALD A. BOYLE.





PHONOGRAPH.

1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 1.

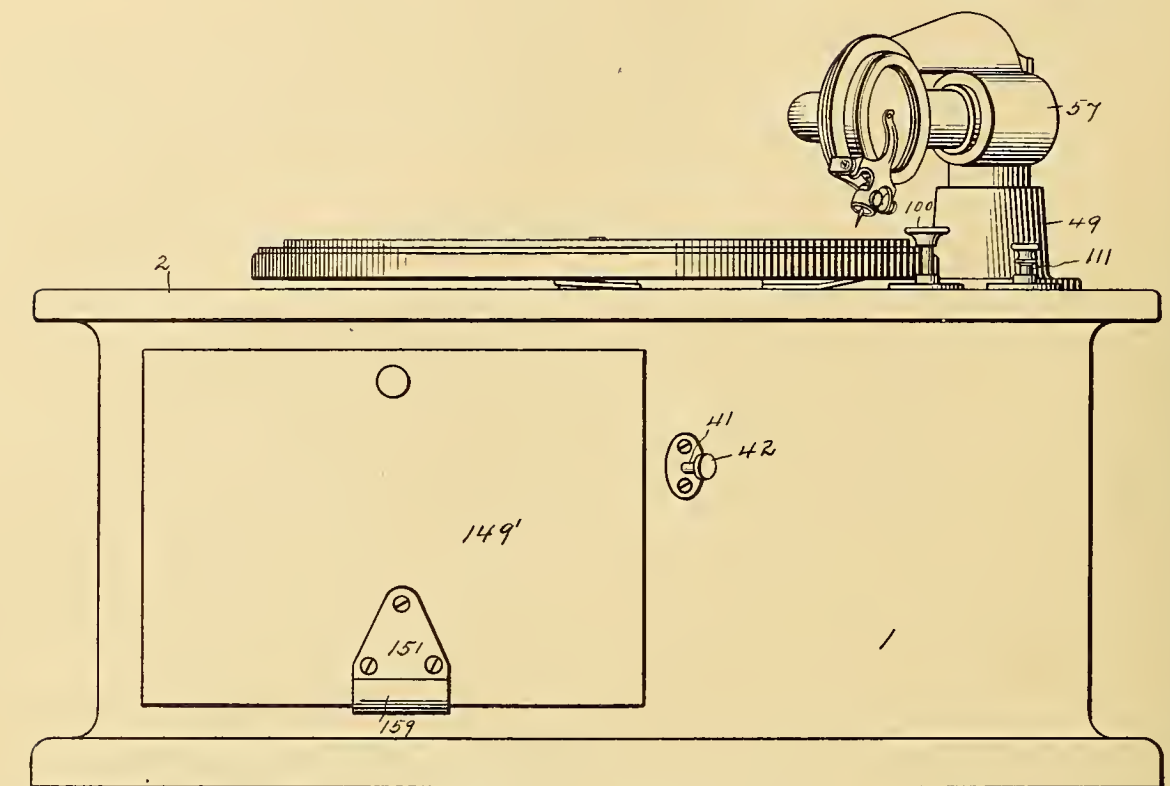


Fig. 1.

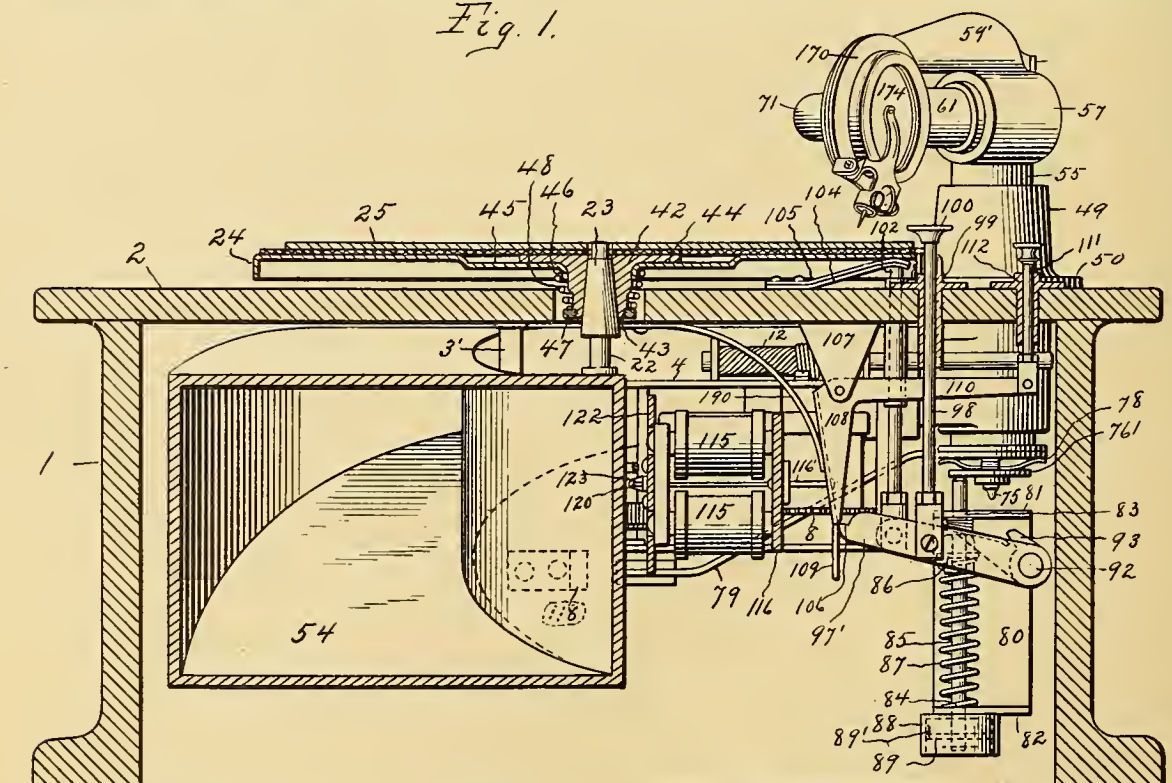


Fig. 5

Witnesses:  
Louis Sanders  
Gertrude L. Smith.

Pliny Catucci Inventor  
By Attorney  
Louis M. Sanders





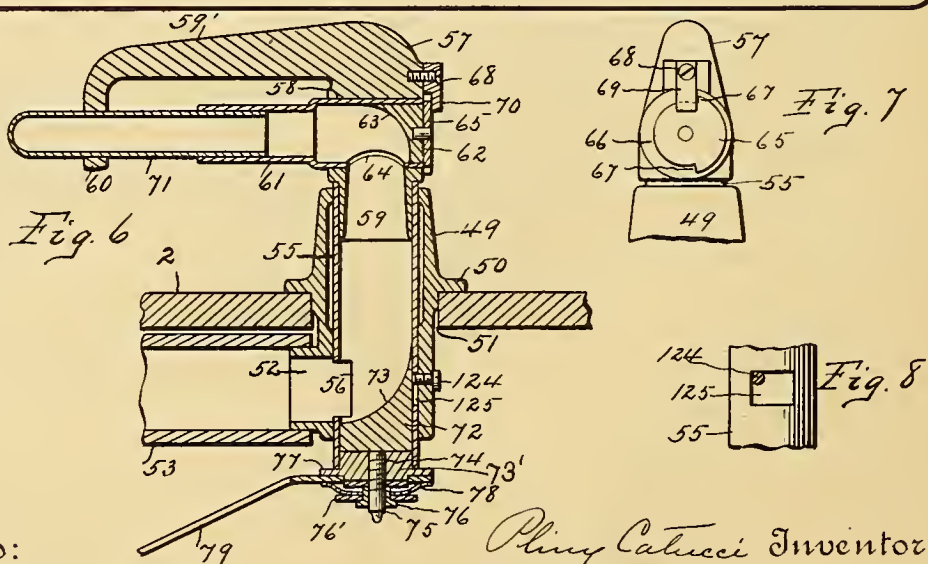
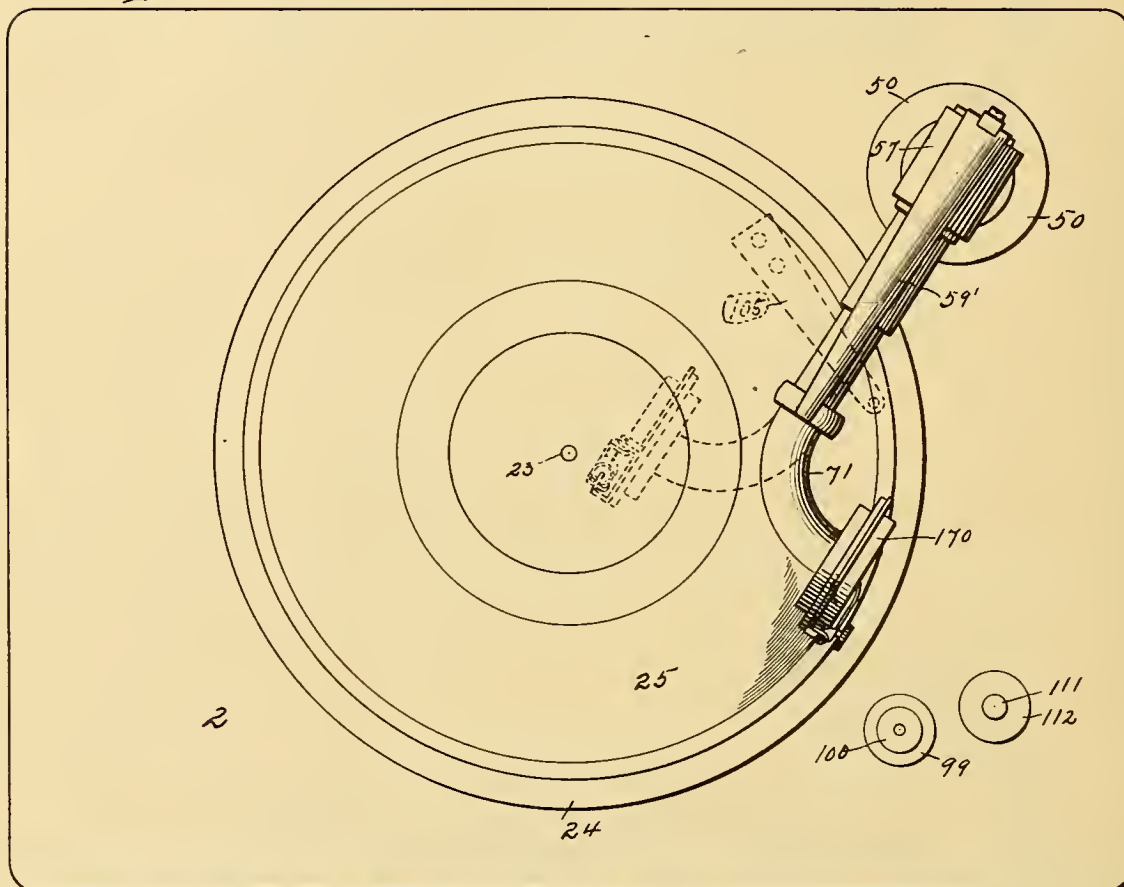
PHONOGRAPH.

1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 2.

Fig. 2.



Witnesses:  
Louis Sanders Jr.  
Gertrude L. Smith.

By Attorney  
Louis M. Sanders



P. CATUCCI.

PHONOGRAPH.

APPLICATION FILED APR. 26, 1912.

1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 3.

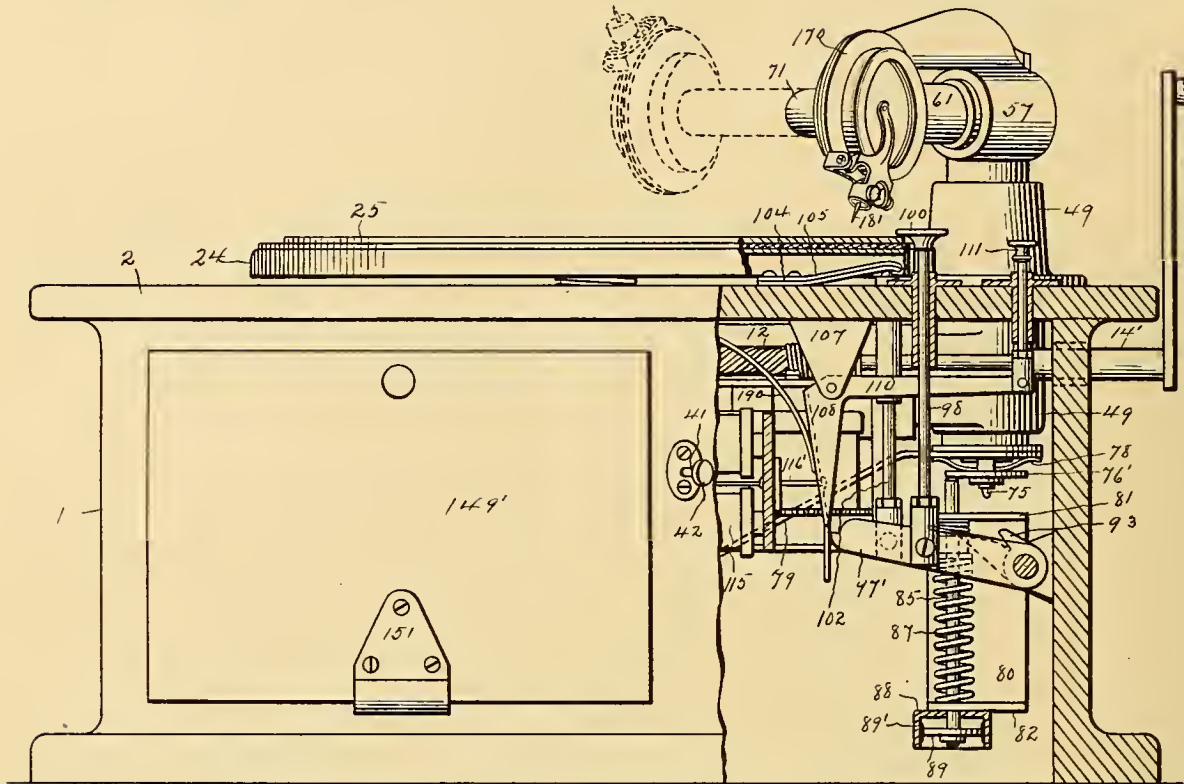


Fig. 3

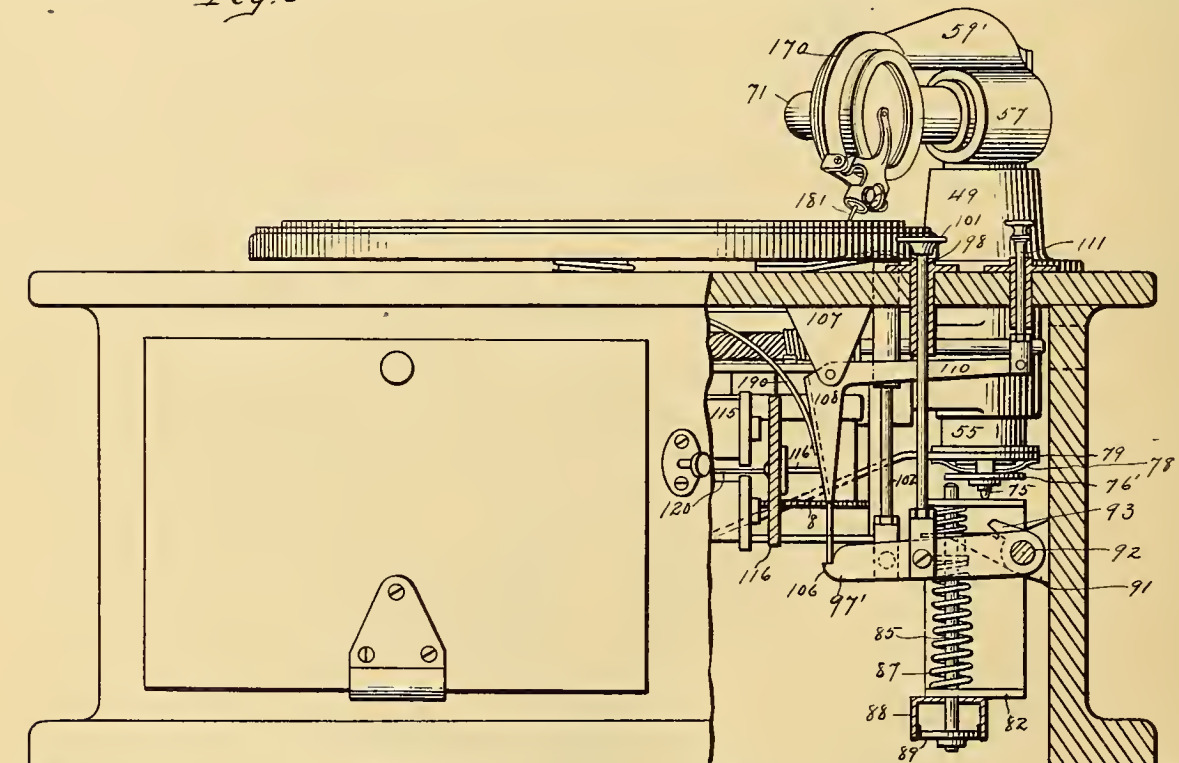


Fig. 4.

Witnesses:  
Louis Sanders Jr.  
Gertrude L. Smith.

Pliny Catucci Inventor  
By Attorney  
Louis M. Sanders





P. CATUCCI.

PHONOGRAPH.

APPLICATION FILED APR. 26, 1912.

1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 4.

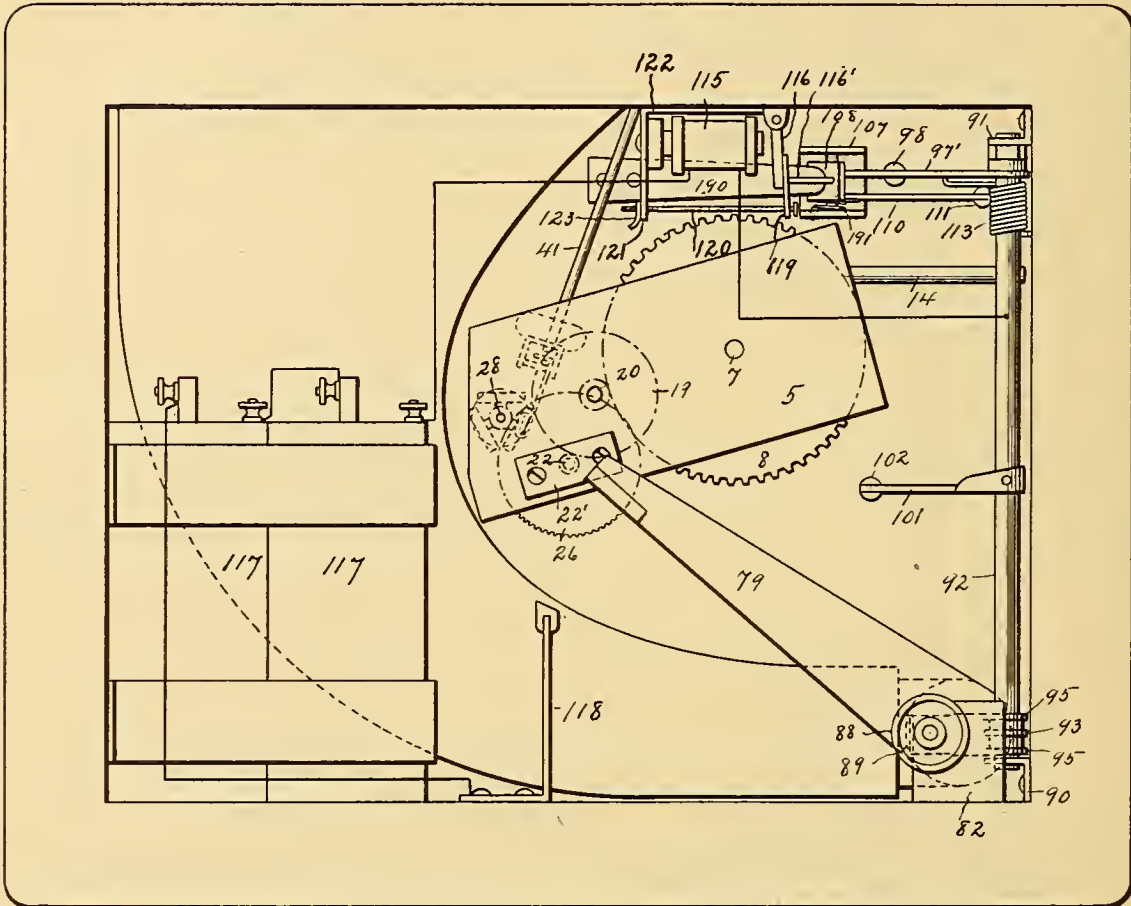


Fig. 9

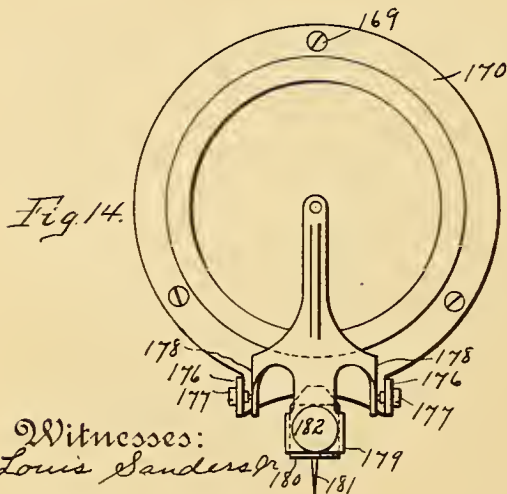


Fig. 14.

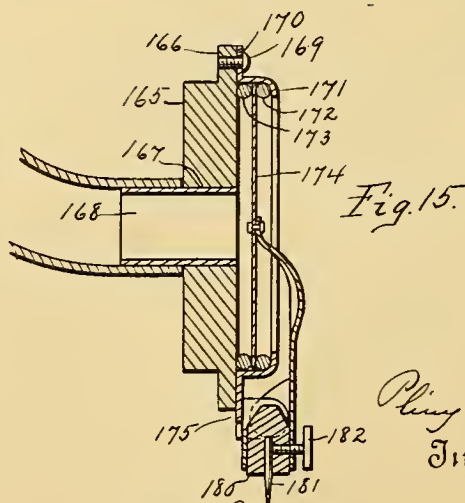


Fig. 15.

Witnesses:  
Louis Sanders  
Gertrude L. Smith

Pliny Catucci  
Inventor  
By Attorney  
Louis M. Sanders



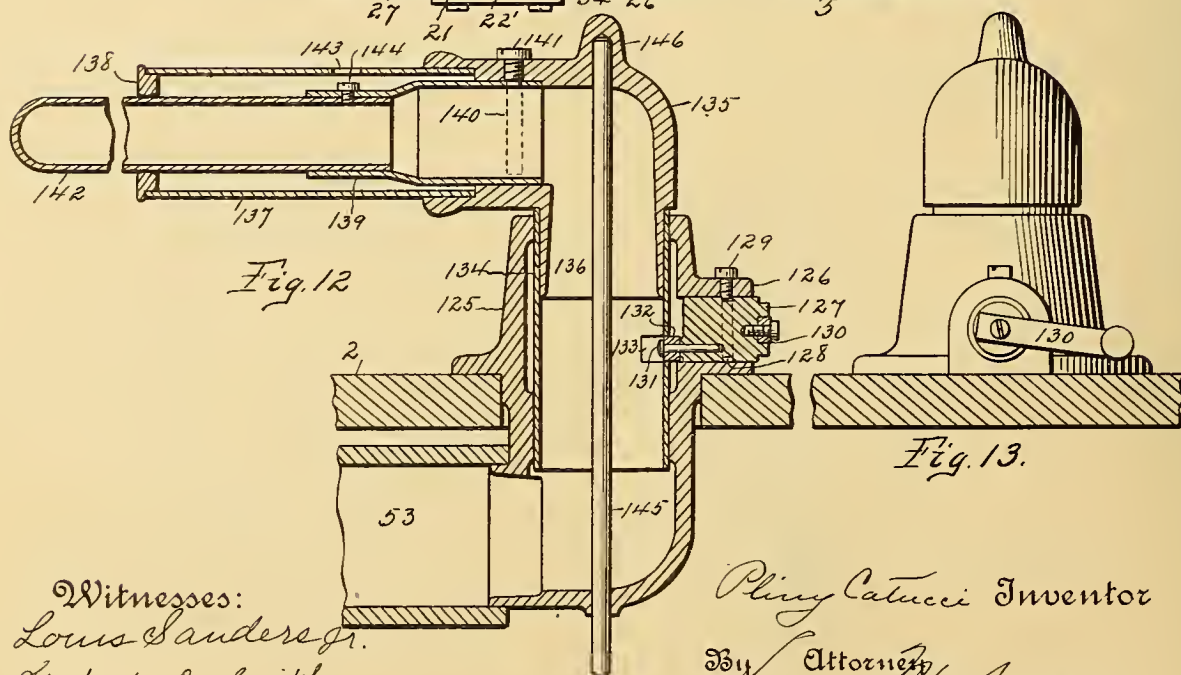
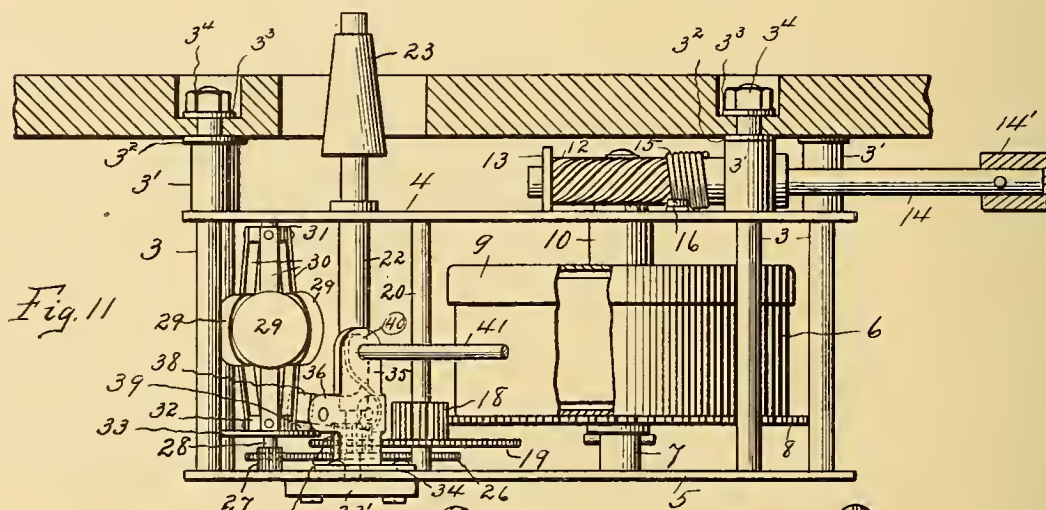
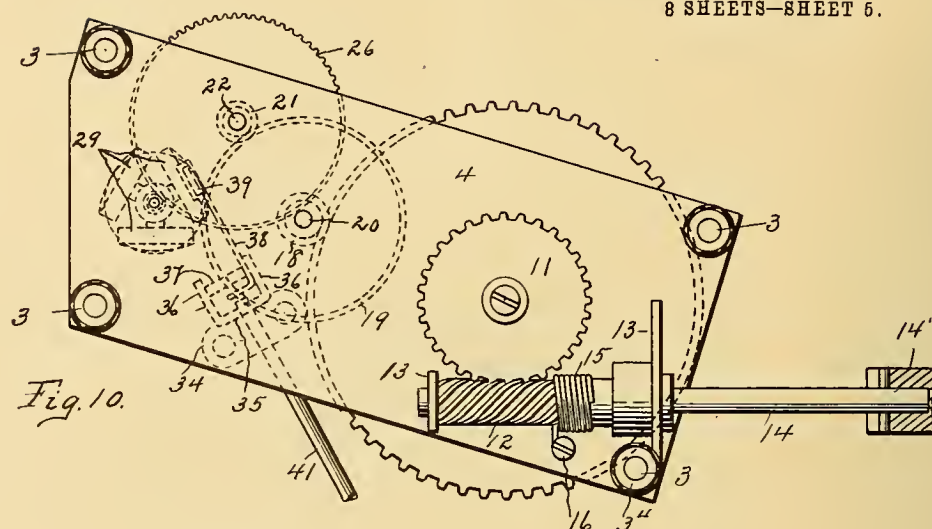


PHONOGRAPH.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 5.

1,087,106.



Witnesses:  
Louis Sanders Jr.  
Gertrude L. Smith.

Pliny Catucci Inventor  
By Attorney  
Louis M. Sanders



1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 6.

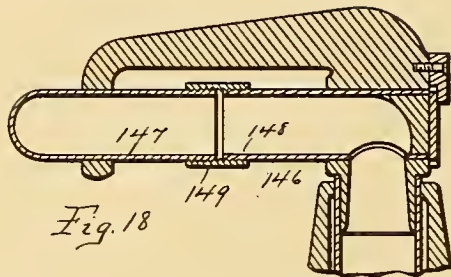


Fig. 18

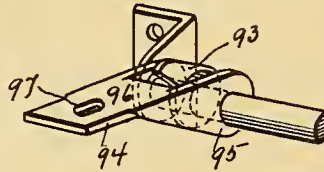


Fig. 17

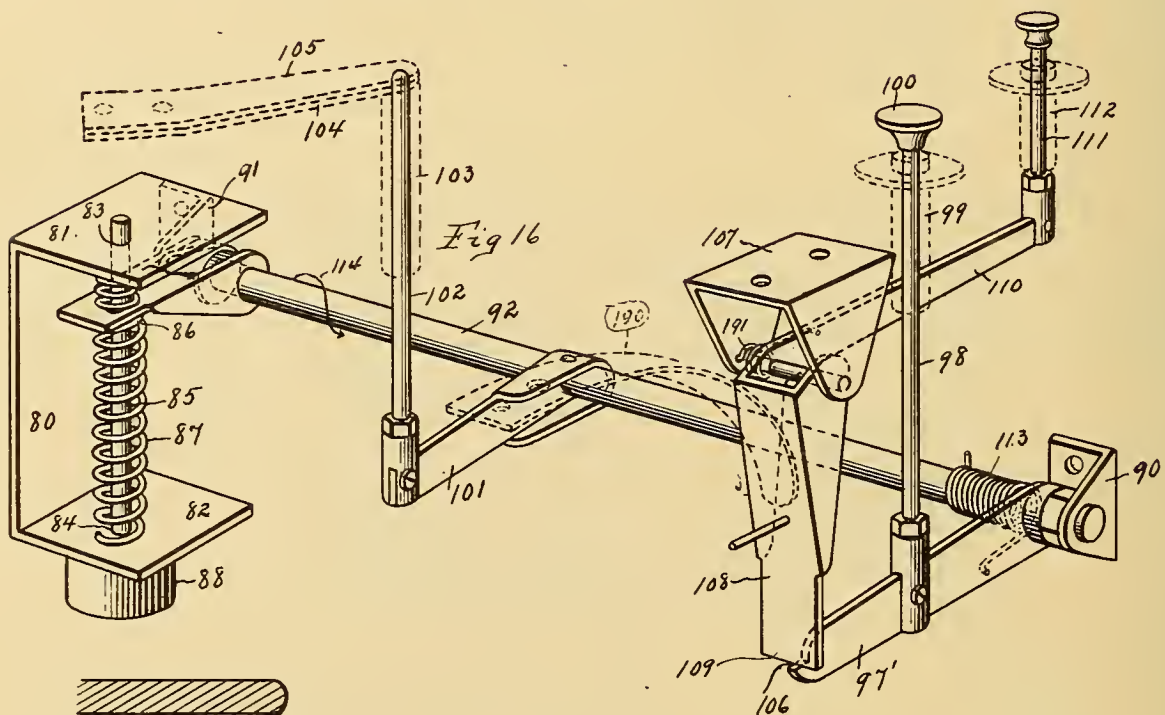


Fig. 16

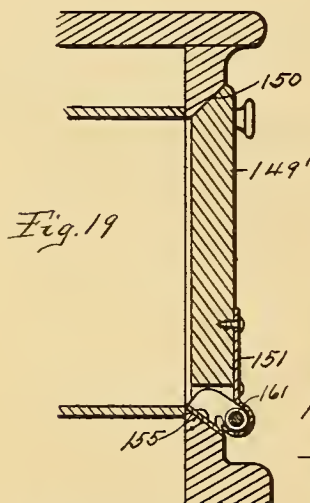


Fig. 19

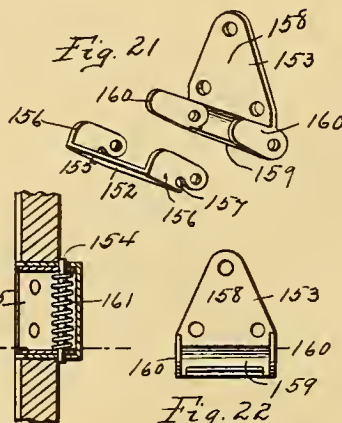


Fig. 20

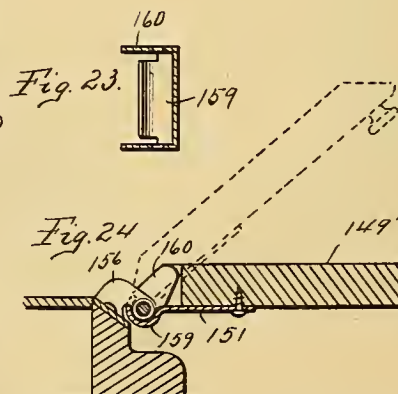


Fig. 21

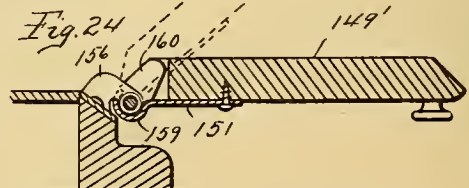


Fig. 22

Witnesses:  
 Louis Sanders, Jr.  
 Gertrude L. Smith.

Pliny Catucci Inventor  
 By Attorney  
 Louis M. Sanders





P. CATUCCI.

PHONOGRAPH.

APPLICATION FILED APR. 26, 1912.

1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 7.

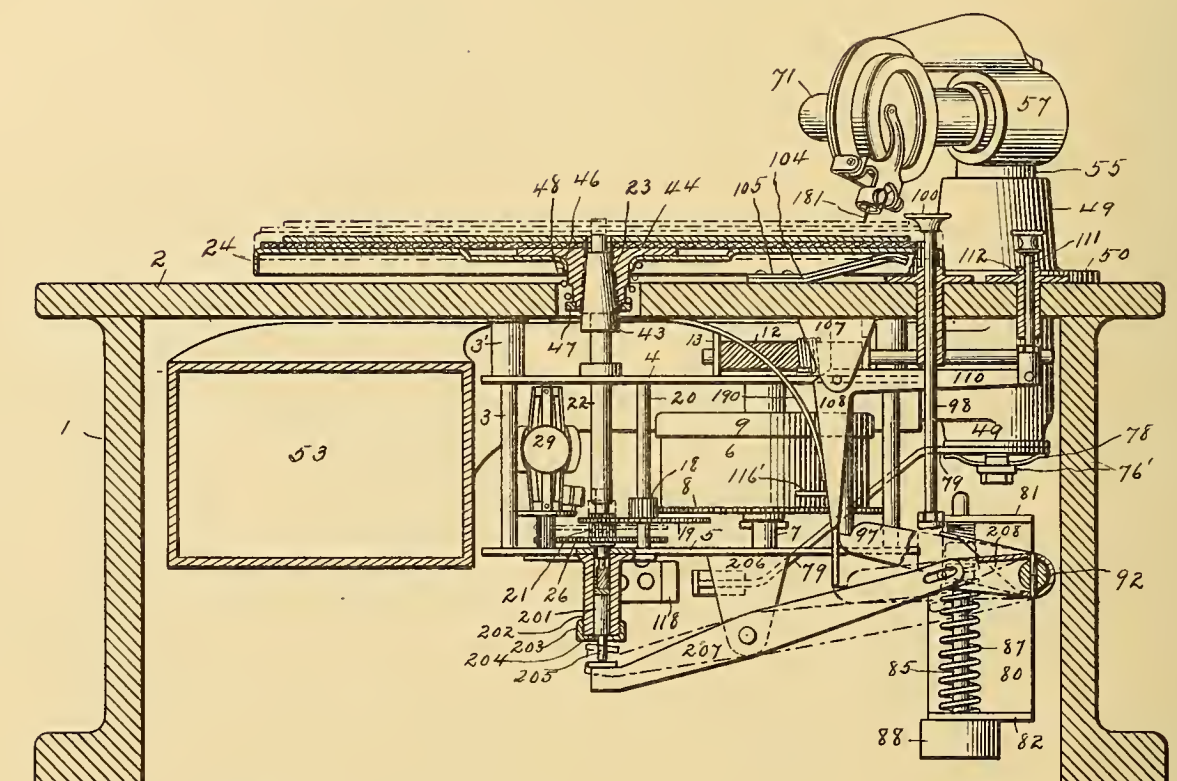


Fig. 25.

Witnesses:  
Louis Sanders Jr.  
Gertrude L. Smith.

Pliny Catucci Inventor  
By Attorney  
Louis M. Sanders





P. CATUCCI.

PHONOGRAPH.

APPLICATION FILED APR. 26, 1912.

1,087,106.

Patented Feb. 17, 1914.

8 SHEETS—SHEET 8.

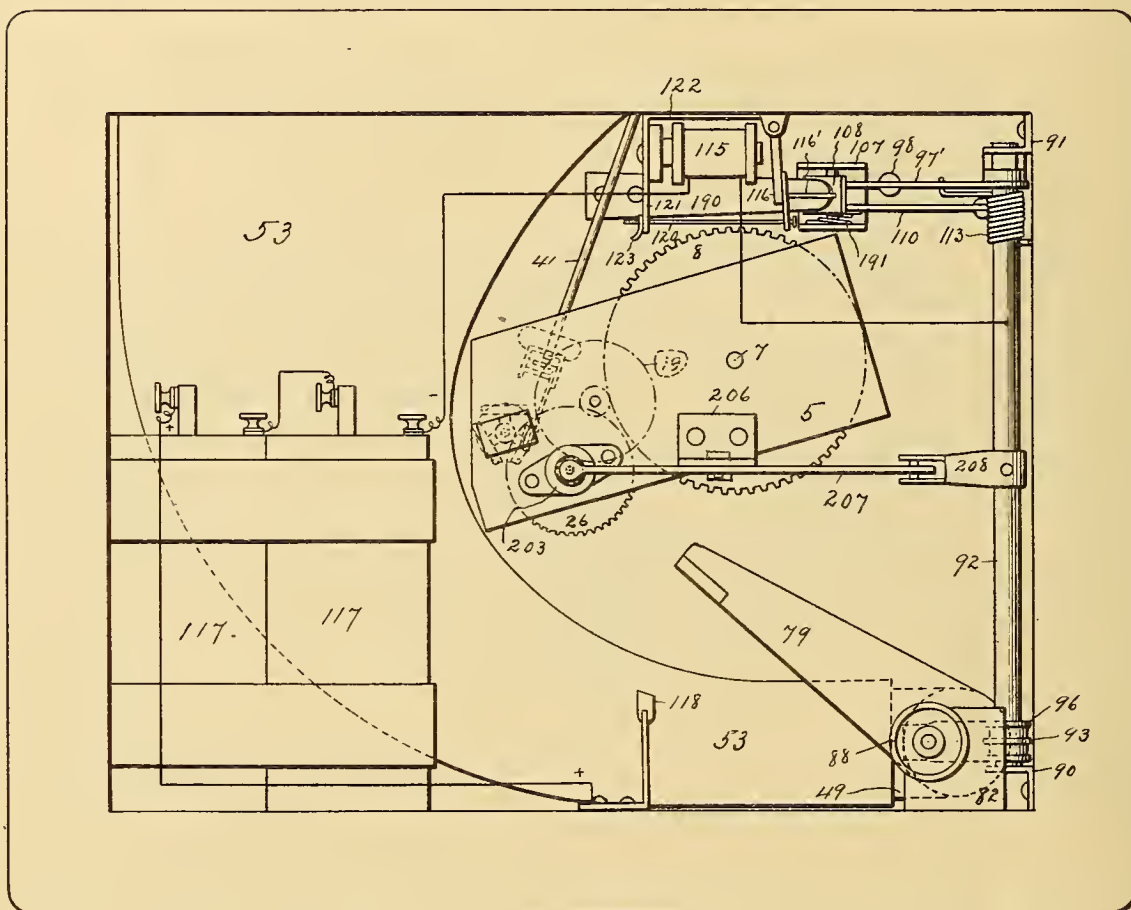


Fig. 26.

Witnesses:  
Louis Sanders Jr.  
Gertrude L. Smith.

Pliny Catucci Inventor  
By Attorney  
Louis M. Sanders

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,087,106.

Specification of Letters Patent.

Patented Feb. 17, 1914.

Application filed April 26, 1912. Serial No. 693,352.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to phonographs for use in connection with the reproduction of sound by means of records, and has for its object the general improvement of the various details of the phonograph, and is intended broadly to include means for relatively separating the sound box from the record support at a predetermined point or position which in practice is fixed as at the end of the selection upon the record. This separation of sound box and record may be by permitting the record support to rotate at a relatively fixed position and providing means for elevating the sound box and its stylus free from the record, or on the other hand, the sound box itself may be made to occupy a relatively fixed position with the stylus point resting upon the face of the record, with means for withdrawing the record and its support from contact with the stylus and providing such means with additional parts whereby such withdrawal will stop the motor and consequently the rotation of the record support.

Other features of improvement relate particularly to the motor and the means for winding up the motor spring; the turn table and the method of mounting the same, whereby the table itself has a flexible connection with the drive shaft upon which the same is mounted, and important improvement is made in the sound conveyer whereby the sound box may be rotated through an angle of substantially 180 degrees to carry the stylus of the sound box out of and into position for engagement with the record disk; another important feature resides in the sound conveyer, the same being made of telescoping parts with connections whereby the movable telescoping part may be actuated to be lifted through a distance sufficient to carry the stylus of the sound box entirely free from the record, as for example, at the end of the rendition of the selection upon the record; another feature of the invention embodies automatic mechanism whereby, at the close of a rendition

of a selection, the sound box and its stylus are raised clear from the record and simultaneously the motor is automatically stopped. I also provide a novel form of trap door for the outer end of the sound conveyer, so that the sound waves as they pass from the sound conveyer to the open atmosphere may be damped or muffled to any desired degree.

In the accompanying drawings, Figure 1 is a front elevation of my improved phonograph showing the sound box and conveyer in elevated position. Fig. 2 is a plan view of the same. Fig. 3 is a view similar to Fig. 1 with the left hand end of the case broken away to expose a part of the automatic mechanism in the interior of the case, and showing the sound box and conveyer in elevated position. Fig. 4 is a view similar to Fig. 3, but with the sound box in a position occupied during the completing of a record. Fig. 5 is a sectional view showing the interior mechanism in the positions occupied by them when the motor is stopped and the sound conveyer elevated. Fig. 6 is a vertical section of the sound conveyer showing the details of the mechanism and the various bearings connected therewith. Fig. 7 is an end elevation of the sound conveyer showing the stops for limiting the position of the sound box when the same is either in the position for playing or in reversed position for the readjustment of the stylus needle. Fig. 8 is a side elevation of a short portion of the telescoping conveyer tube showing the limiting set screw. Fig. 9 is a bottom plan view of the structure illustrating the position of the motor and the details of the stop mechanism. Fig. 10 is a top plan view of the motor showing the details of the winding mechanism and of the hand mechanism for stopping the motor. Fig. 11 is a side elevation of the motor disconnected from the case. Fig. 12 is a longitudinal section and a modification of the sound conveyer showing the means employed for elevating the same. The elevating device of this modification contemplates the omission of the automatic elevating device as illustrated in the other figures. Fig. 13 is an end view of the modification illustrated in Fig. 12 showing the hand lever for elevating the sound box and telescoping sound conveyer by hand. Fig. 14



is a front elevation of the sound box showing the details of the stylus lever. Fig. 15 is a vertical sectional view of the same. Fig. 16 is a detached view in perspective of the operating rock shaft hereinafter referred to. Fig. 17 is a detached perspective view of one end of said shaft. Fig. 18 is a vertical sectional view of a still further modified form of a sound conveyer. Fig. 19 is a sectional view through the spring hinge structure for the amplifying part of the phonograph. Fig. 20 is a horizontal sectional view of the hinge through its axis. Fig. 21 illustrates the parts of the hinge structure separated to show their details. Fig. 22 is a rear view of the door section of the hinge. Fig. 23 is a sectional view of one of the hinge members. Fig. 24 is a sectional view similar to Fig. 19 showing the limiting position of the door and its various adjustment. Fig. 25 is a side elevation of the mechanism within the case showing the structure whereby the record support may be raised and lowered, the general features of the structure being the same as illustrated in the preceding figures. Fig. 26 is a bottom plan view of the structure shown in Fig. 5.

It should be stated at this point that I make no specific claim to the sound box in this application as said sound box forms the subject matter of a co-pending application in which its details are more specifically described and claimed. It is shown in connection with the other parts in this application for the purpose of gaining a clearer understanding of the objects and purposes of the various parts of the phonograph and its method of operation.

Similar reference numerals refer to like parts throughout the specification and drawings.

The case 1 may be of any desired or preferred form, but as shown, it consists of a generally rectangular box in which and upon which are mounted the working parts of the phonograph. As shown the box is covered at the top and open at the bottom in order to make the interior of the structure more readily accessible.

Beneath the cover 2 and suspended from the same, by means of the bolts 3 is the motor, the details of which I will now proceed to describe: The motor consists of the upper plate 4, the lower plate 5 rigidly connected together by means of the bolts 3, the plates 4 and 5 forming the supports for the train of gears and the motor spring. The spring is mounted in the spring box 6 and is of the usual spiral or clock spring type, the inner end of said spring being connected to the spring shaft 7, and its outer end connected to the cylindrical part of the spring box. Mounted upon this shaft 7 and rigidly connected thereto is the main driving gear 8.

The cover 9 of the spring box, when in position is rigidly connected to the spring box itself, and said cover has rigidly connected therewith, the sleeve 10, which latter is mounted upon the upper end of the shaft 7 so that the rotation of the sleeve 10 will cause a rotation of the spring box itself and consequently wind up the spring. The bolts 3 extend through the spacing thimbles 3', rubber gaskets 3<sup>2</sup>, the cover 2, gaskets 3<sup>3</sup>, and are secured above the cover by the nuts 3<sup>4</sup>. Ordinarily the winding mechanism of motors of this type includes a pawl and ratchet mechanism for preventing the unwinding of the main or driving spring when hand power is applied to the same to wind it up and when such hand power is relieved. Many objections could be set up to this method of winding or preventing the unwinding, among which may be stated that it is noisy, and if the motor is wound while the selection is being played, it may and often does detract from the beauty of the selection; for this reason I have devised the new method and mechanism for winding which consists in rigidly mounting, upon the sleeve 10, a spiral gear 11, locating the same outside of the upper plate 4, and adjacent to said spiral gear I mount the spiral worm 12, the latter being supported in the bearings 13 and having the reduced extension 14 to which the winding crank 14' may be attached for winding up the main spring. The teeth of both of the spiral gear and spiral worm are cut upon an angle of 45 degrees. The location of the spiral gear 11, outside or above the plate 4, permits said plate to receive the end thrust of the gear 11 due to the tendency of the spiral worm 12 to force said gear 11 and the sleeve 10 endwise, toward the spring box. In order to prevent the tension of the main spring, when fully or partially wound, from reversing the rotation of the spiral worm 12, I provide a spiral spring 15 wrapping the same around the body of the spiral worm 12 quite closely, and attaching one end of the same to the upper plate 4, as at 16. The interior of the spiral spring 15 is always in frictional contact with the cylindrical surface of the spiral worm 12, but it will be noted that when the reduced extension 14 or the spiral worm 12 is rotated to wind up the main spring, the frictional contact with the spring 15 will operate to unwind or open up said spring, so as to permit the free rotation of the worm in one direction, that is the direction required for winding up the spring; when however the winding power is removed the tendency of the gear 11 through the influence of the main spring in the spring box will be to reverse the direction of rotation of the spiral worm 12. The slightest reverse rotation of the spiral worm 12 will cause the spring 15 to hug the cylindrical surface of the spiral



worm 12 in close frictional engagement, and thereby immediately arrest any tendency to reverse rotation. I regard this as a valuable feature of my invention for the reasons  
5 above set forth.

The train of gears leading from the main driving gear 8 consists of the spur pinion 18 meshing with the gear 8, the gear 19 rigidly connected to the pinion 18, and both gear  
10 and pinion rigidly mounted upon the shaft 20, which latter is provided with reduced pivot bearings supported in the upper and lower plates 4 and 5. Meshing with the gear 19 is the pinion 21 mounted upon the shaft  
15 22, the latter shaft being supported on a fiber bearing 22' on the under side of the lower plate 5 and extending up through the plate 4, and has at its upper end the conical mandrel 23, which latter serves as a support for  
20 the rotating table 24, upon which the record 25 is placed. Mounted also upon the lower end of the shaft 21 is the gear 26 which latter engages the pinion 27 of the governor shaft 28. The governor is of the usual type  
25 having the three weights 29 mounted upon the flat springs 30, the upper ends of the latter being rigidly connected to the collar 31, as clearly shown in Fig. 10. The lower ends of these flat springs are rigidly connected to a sliding collar 32, which latter  
30 has a plate or extension 33 serving as a brake disk. Mounted upon the lower plate 5 is a bracket 34, shown more clearly in its location in Fig. 9. This bracket has an upright portion 35 with forwardly extending  
35 apertured lugs 36. In these apertures is mounted a short stub shaft 37, upon which is mounted a bell crank 38, the latter having one arm extending forwardly into the path  
40 of the disk 33. The outer end of the arm 38 is provided with any suitable friction material 39 for contact with the upper face of the governor brake disk 33. The other arm 40 of the bell crank extends upwardly and  
45 is given a twist as shown in Fig. 10 and it lies just inside of the upright extension 35 of the bracket 34. The upper end 35 of this bracket is provided with a screw threaded aperture into which is screwed the controller  
50 shaft 41, the latter extending outside of the case and provided with the knurled turning button 42. In this manner, by screwing the controller shaft or rod 41 in or out, the rate of rotation of the mandrel shaft 22 is controlled within the required limits, inasmuch  
55 as the inner end of the controller shaft 41 will limit the oscillation of the bell crank 38. As the control shaft 41 is screwed out, the bell crank 38 is permitted a greater degree of oscillation, and consequently the  
60 disk 33 may rise under the influence of the centrifugal action of the balls 29. If however, the control rod or shaft 41 is screwed in, the degree of oscillation of the bell crank  
65 is correspondingly limited, with a conse-

quent limitation of the governor balls and shaft and with a resultant diminution in the rate of rotation of the mandrel shaft 23.

As above set forth, the mandrel 23 projects above the case cover 2, as shown in  
70 Fig. 5, and is made conical to receive the conically apertured mandrel sleeve 42, so that when said sleeve is set upon the conical mandrel 23, they will wedge together and rotate together through their frictional contact  
75 with each other. This mandrel sleeve 42 is provided with a screw thread at its lower end, as shown at 43, and a flat laterally projecting flange 44 at its upper end. The rotating table 24 is centrally depressed,  
80 as at 45, and provided with a central flanged aperture 46 which fits the exterior surface of the mandrel sleeve 42 and lies against the under side of the flange 44. The nut 47 is screwed upon the lower screw threaded end  
85 of the mandrel sleeve 42. Between said nut 47 and the flat under face of the table 24 is located the coil compression spring 48. This structure provides a yielding support for the table 24 and permits the same to  
90 yield under compression from the upper side, as from any accidental depression thereof, or even under the influence of the weight of the sound box when the same appears through its stylus upon a record. It  
95 is customary in structures of this kind, either to cover the upper face of the table 24 with a layer of felt cemented or glued thereon, or to have a loose disk of felt for the record 25 to rest upon, the purpose, of  
100 course, being to serve as friction means for causing the record, through its own weight, to frictionally engage the upper face of the table 24, and rotate freely therewith. It will now be obvious that with the motor  
105 spring wound up and the control rod 41 screwed out to a sufficient degree to permit the rotation of the governor shaft 28, the rotating table 24 will be permitted to rotate with any degree of speed within the limits  
110 of the mechanism and if a record, as 25, be located upon the table, such record will be caused to rotate with that same degree of speed.

As a means for supporting the sound box  
115 and for conveying the sound vibrations from the record, I provide the following mechanism: Mounted upon the cover 2 of the case adjacent to the periphery of the table 24, is the tubular standard 49 flanged as at 50 to  
120 rest upon the upper face of the case and projecting through the aperture 51 in the cover 2, to a point considerably below the cover. The lower end of this tubular standard is open and it also has a lateral opening,  
125 as at 52, with which latter opening is connected the horn 53 which latter is curved around and opens out to the front of the case, as at 54. Extending vertically through the tubular standard 49 is the tube 55, which  
130



latter is provided with a lateral opening 56 to register with the lateral opening 52 of the standard 49. The upper end of the tube is provided with a casting 57 having the cross aperture 58 and the vertical aperture 59 therein, which latter opens into the interior of the tube 55, as clearly shown in Fig. 6. This casting is provided with the overhanging arm 59' extending substantially parallel to the lateral aperture 58 therein, and terminating in the apertured supporting end 60, the aperture thereof being in alinement with the aperture 58. Extending into the aperture 58 is the tube 61 loosely mounted therein and capable of rotation. The outer end of the tube 61 is closed with a flanged plug 62, the inner face of which is curved, as shown at 63, so as to make a curved passage around through the tube 61 into the tube 55 by way of a registering aperture 64 in the side of the tube 61. The outer end of the plug 62 is flanged, as shown at 65, and said plug 62 is rigidly fixed in the end of the tube 61, as shown. The flange 65 is cut away, as shown at 66, for a little more than a semicircumference, so as to leave the shoulders 67. Secured to the end of the end of the casting 57 adjacent to the flange 65, and by means of the screw 68 is the stop piece, said stop piece being provided with an overhanging end 70 which overlaps the flange 65. The main body of this stop piece 69 lies in the path of the shoulders 67, so that the tube 61 may be rotated through an angle of about 180 degrees, and when in one of its positions as for example, that shown in Fig. 6, the opening 64 will be in registry with the passage 59 and the inner passage of the tube 55. Extending into the opposite end of the tube 61 and through the apertured overhanging end of the casting 57 is the conveyer tube 71. This tube 71 forms a fairly close fit in the interior of the tube 61, so that while detachable, the oscillation of the tube 71 will cause a consequent oscillation of the tube 61 with the stop shoulders limiting the degree of such rotation. The outer end of the tube 71 beyond the overhang 60 is curved around through an angle of about 90 degrees and its outer end is slotted and pinched together slightly so as to form a gripping engagement with the connecting thimble of the sound box hereinafter to be described.

From an inspection of Fig. 2 of the drawings, it will be now observed that the sound box and the curved end of the conveyer tube 71 are in a position for the sound box stylus to bear upon the surface of the record and that the degree of pressure with which the stylus bears upon the record depends upon the weight of the sound box and the curved end of the conveyer tube 71. With the sound box stylus bearing upon the surface of the record and said record rotating upon the

table 24 through the influence of the motor heretofore described, it will be readily understood that the sound vibrations recorded upon the record will be conveyed through the tube 71, thence through the tube 61 to the passage 64, thence through the lateral opening 56 and out through the lateral opening 52 of the tubular standard 49, and thence outward through the horn 53 to the opening 54. This structure as thus far described reduces very materially the number of turns or bends in the sound conveyer between the sound box and the point of exit for the sound. This is a very important feature for the reason that with each turn or bend around which the sound must travel, its volume will be correspondingly diminished and the fewer number of bends or turns which the sound is constrained to make will result in correspondingly increased volume.

The lower end of the tube 55 is closed by means of the plug 72 which, upon the interior of the tube, is curved, as at 73 to form an easy turn for the sound vibrations and to direct them to the lateral opening 56. As thus far described and shown, the casting 57 might easily rest upon the upper end of the tubular standard 49, but in this form of my phonograph, it is not the intention for the casting 57, and the parts attached thereto, to be supported directly by the standard 49 although guided thereby through the medium of the tube 55. Into the lower end of the tube 55 is further fitted a flanged plug 73' centrally apertured and screw threaded as at 74 carrying in said screw aperture a bearing pin 75. Upon the outer portion of the pin 75 is screwed a flanged nut 76 between the flange of which and the flange 77 of the plug 73 are located, first, a washer 76', next a star spring wheel 78, and finally the stop arm conductor 79, the latter being in frictional engagement with the flange 77 and the star spring 78. This structure is such that the arm 79 may be rotated independently of the plug 73, but the frictional engagement is such that under normal strains, the swinging or oscillation of the plug 73 will carry with it the arm 79.

As a means for stopping and starting the motor by hand, I provide the following mechanism: Referring to Fig. 5 it will be noted that on the inside of the case secured at the right hand end of the rear side of the case is the bracket 80 provided with the rectangular arms 81 and 82 projecting toward the interior of the case. These arms are apertured as at 83 and 84 for the reception of the vertically sliding pin 85, said pin being in position to engage the washer 76', which as hitherto described, is located upon the pivot pin 75 at the lower end of the tube 55. The bracket 80 with its upper arm 81 is located in position so that the pin 75 with its bearing point may rest upon the



upper face of the arm 81, which serves as a bearing support for the entire vertically sliding conductor tube, and its parts which are contained in the tubular standard 49.

5 Secured to the pin 85 near its upper end and beneath the arm 81 is the collar 86 between which and the lower arm 82 of the bracket 80 is located the compression spring 87. The tendency of this spring 87 is to

10 elevate the pin 85, which, it will be observed, bears upon the under side of the washer 76' and when unconstrained will serve to elevate the telescoping sound conductor tube and its parts and elevate the bearing pin

15 free from the upper face of the outwardly projecting arm 81, so that the conductor tube and its parts under such circumstances are really supported by the compression spring 87. In this condition, it will be

20 noted upon reference to Fig. 1, that the sound conductor tube together with the sound box will be raised free from the record. Beneath the arm 82 and surrounding the lower end of the pin 85 is the dash pot

25 88 within which and secured to the lower end of the pin 85 is the piston dash 89 and cup leather 89'. This dash pot serves to prevent the too vigorous action of the spring 87 in elevating the telescoping sound con-

30 veyer when the restraining mechanism for the spring is tripped or released. Under the circumstances of elevating the sound conveyer and sound box as described, it will be noted, that the stop shoulders 67 hitherto referred to and shown in Fig. 7, will

35 prevent the stylus needle of the sound box from remaining in contact with the record, when the sound conveyer and its parts are elevated by the spring 87 as just described.

40 As a means for compressing the spring 87 and as a consequence, depressing the pin 85, I provide the following mechanism: Upon the interior of the case at the end wall thereof, adjacent to the bracket 80, I locate

45 a pair of bearing brackets 90 and 91, which serve as bearings for the rock shaft 92. Mounted upon this rock shaft are various instrumentalities, hereinafter more particularly described. For the present, however,

50 I will confine the description to the mechanism for compressing the spring 87 and depressing the pin 85. Rigidly mounted upon the rock shaft 92 adjacent to the pin 85, I locate the arm 93. Loosely mounted upon

55 the shaft 92 is the arm 94 which latter consists of a piece of sheet metal blanked to shape, and having the apertured supporting lugs 95 through which the shaft 92 passes. As illustrated in the drawings, the arm 93

60 is located between the two supporting lugs 95. This arm also has the forwardly projecting flat portion 96 slotted at the end as at 97. This flat portion extends rearwardly or toward the shaft 92 to a distance to bring

65 its rear end in position for engagement with the arm 93. The slot 97 in the forward end of the flat part 96 is for the purpose of permitting the upper end of the pin 85 to pass therethrough with the flat portion 96 resting upon the collar 86. The normal position of the shaft 92 is such that the arm 93 is out of contact with the flat part 96, but said flat part in any position will rest by its own weight upon the upper side of the collar 86. At the front end of the shaft 92 is the forwardly projecting arm 97' rigidly connected to the shaft, as shown and from this arm 97' the push pin 98 extends upwardly through the guide sleeve 99 and terminates in the push pin button 100 upon the exterior cover of the case. Upon the middle of the shaft 92 is a similar arm 101 from which extends upwardly, the brake pin 102 through a guide thimble 103 to the upper side of the cover in position to engage the under side of a brake spring 104, the latter being secured to the upper face of the cover 2 in position to engage the lower face of the rotating table 24. In order that the frictional engagement of the brake spring 104 may be more effective, I provide a brake leather 105 upon the upper face of the brake spring. The forward end of the arm 97' is provided with a notched shoulder 106. Suspended from the under side of the cover by means of the bracket 107, is the bell crank lever 108, said bell crank having one of its arms as 109 extending down into position for engagement with the notched shoulder 106, when the arm 101 is depressed; the other arm 110 of the bell crank extends horizontally beneath the cover in position for engagement with the vertical push pin 111, the latter extending through the cover by way of a guide sleeve 112. Surrounding the shaft 92 near its forward end is a spring 113, one end of which is connected with the arm 97' and the opposite end after having made several turns around the shaft 92 bears upon the inner side of the case. The tendency of this spring is to rotate the shaft in the direction of the arrow 114.

I will now proceed to describe the operation of the starting and stopping mechanism: Let it first be understood that the motor spring has been wound up and that the control rod 42 has been unscrewed to a distance to permit the governor to rotate freely. In the position of the parts just before starting, the lower end of the arm 109 of the bell crank 108 will be disengaged from the notch 106, the spring 113 will now have rotated the shaft 92 in position to elevate the rod 102 against the brake spring 104, which in turn bears upon the under side of the rotating table 24. The friction offered by this brake spring against the table 24, will be sufficient to hold the table 24 and consequently stop the motor. If now, the push pin be depressed through the push but-



ton 100 the shaft 92 will be rotated to a position to permit the lower end 109 of the bell crank 108 to engage the notch 106. This will carry with it the brake rod 102 and thus permit the spring 104 to fall away from the under side of the table 24. During this rotation of the shaft 92, the arm 93 which up to this time has been entirely free from the flat portion 96 of the lever 94 will now contact with said portion and cause said lever to compress the spring 85 when the push pin 98 has been depressed a sufficient distance to cause the engagement of the bell crank lever arm 109 to engage the notch 106. The spring 85 will have been simultaneously depressed to permit the lowering of the telescoping conductor tube 55. This will permit the stylus of the sound box to bear upon the record and inasmuch as the turn table is free to rotate, the record will be duly rendered. Whenever it is desired to stop the motor it is only necessary to press the push pin 111 which bears upon the horizontal arm 110 of the bell crank and such depression will cause a disengagement of the vertical arm 109 of the bell crank from the notch 106. The shaft 92 now being released the spring 87 will be brought into action and through the lever 94 bearing upon the arm 93 will cause a rotation of the shaft 92, which rotation will serve to elevate the push pin 102 against the under surface of the brake spring 104, and this in turn will bear upon the under side of the rotating table 24 and consequently stop the motor. Simultaneously with the action of the spring 87, the pin 85 is elevated against the washer 76' resulting in the elevation of the tube 55, as shown in Fig. 5. This elevation will carry with it the sound box with its stylus free from the record, the sequence of operation being due to the making the arm 93 rigid upon the shaft 92, and the arm 94 loose upon the shaft and is as follows: During the depression of the push pin 98 the first portion of such depression will be occupied in carrying the brake pin 102 downwardly so as to relieve the brake spring from engagement with the table 24. Immediately upon such release the motor will set the turn table in motion. Further depression of the push pin 98 will cause the arm 93 to engage the loose arm 94 carrying the latter with it, and thereby depressing the pin 85 to permit the lowering of the pivot bearing 75, upon the upper face of the bracket arm 81. This lowering of the pivot pin is completed by the lowering of the telescoping sound conveyer tube 55, and with it the sound box with its stylus upon the record. It will thus be seen that with this sequence of operation, the turn table 24 will acquire a considerable rotative speed before the sound box stylus shall have contacted with the surface of the record. A depression of the pin 111 will

simply reverse the sequence of operation, that is to say, the pin 85 will be elevated so as to lift the sound box stylus by means of the conveyer tube free from the record before the rotating table 24 shall have ceased to rotate through the contact of the brake spring 104 therewith.

I will now proceed to describe the automatic action of the device whereby, upon the completion of the rendition of a selection the motor is automatically stopped and the sound box elevated, so as to brake the contact of the stylus with the face of the record. Located adjacent to the lever 108 is a magnet 115 with its armature 116. This armature is connected by a link 116' with the vertical arm of the lever 108. At 117 I locate a pair of dry battery cells connecting the same in parallel with the coils of the magnet, leading the connections from the magnet to any metallic part of the structure, as for example, to the shaft 92. The other circuit wire leads to a contact piece 118, the latter being located in the path of the arm 79 which, it will be remembered, is located in frictional engagement with the parts connected to the lower end of the tube 55. The electric circuit is complete from the batteries to the electro-magnet, thence to the shaft 92, thence through the lever 94, pin 85 to the pivot pin 75 when the same is resting upon the bracket arm 81. From the pivot pin 75 the metallic circuit passes to the arm 79 and when the outer end of said arm is in contact with the contact piece 118, the circuit will be completed. As a means for limiting the throw of the armature 116, I provide an extension 119 upon said armature and connect the same by means of a link 120 with a projecting arm 121 of the magnet supporting bracket 122. This connecting link is provided with an adjusting nut 123 outside of the projecting part of the bracket, so that the throw of the armature may be adjusted to keep within the field of the magnet.

In operation the parts may be so set that when the playing of a record has been completed, the circuit through the magnet 115 will be established, thereby tripping the lever arm 101, resulting in the stopping of the motor and the elevating of the sound box with its stylus free from the record. This is accomplished in the following manner: The arm 59 is first swung to the right as the same would appear in Fig. 2 to the limit permitted by the set screw 124, which passes through the lower end of the tubular standard 49 and extends into the slot 125 provided in the tube 55. This slot is of dimensions to permit the vertical play of the tube 59 and also the lateral play of the same to the limits described for the arm 57. This will carry the arm 79 through its frictional engagement with the parts at the end of the



tube 55, until it contacts with some stationary part of the mechanism. If now, the arm 59 is swung in the opposite direction the arm 79 will contact with the contact piece 118 before the stylus of the sound box has come to the inner circle of the sound record. This will be the point where, when the pivot 75 has established circuit by resting upon the upper face of the plate 81, will form a complete circuit through the magnet 115. The arm 59 may now be swung back to the beginning of the record and the push pin 100 depressed to set the motor in operation as hitherto described. When the stylus of the sound box has traversed the complete record, the arm 79 will have just reached the contact piece 118, and inasmuch as the circuit is otherwise complete this contact will establish circuit through the magnet thus attracting the armature 115 thereby tripping the vertical arm of the bell crank 109, consequently releasing the spring 87 to elevate the sound conveyer through the pin 85.

In Figs. 12 and 13, I have shown modifications of the sound conveyer such as may be used in cheaper grades of instruments than the one just described. In this case more particularly is it adapted for the instrument in which the electric stop mechanism has been omitted. It is however adapted for use where hand elevating of the sound conveyer and sound box do not appear to be objectionable. In this structure I use substantially the same form of tubular standard 125, as heretofore described, supported upon the cover 2 and projecting through an aperture 51. Upon the rear side of the casting 125 is a laterally extending apertured boss 126 in which is located the cylindrical stub shaft 127. A circumferential groove 128 is provided in the shaft to receive a screw 129, which when in position prevents the displacement of the stub shaft 127, yet permits the free rotation thereof. Upon the outer end of the stub shaft 127 I provide a crank 130 by which it may be rotated through an angle of a little more than 180 degrees, being limited by the contact of the crank or handle 130 with the upper face of the box or case cover 2. Projecting from the inner end of the shaft 127 is the eccentrically located bearing pin 131 which carries the antifriction roller 132. The bearing pin 131 and friction roller 132 are in position to engage the edges of a slot 133 in the side of the telescoping tube 134. From the structure as thus described, it will be readily seen that the swinging of the crank or handle 130 from one side to the other will operate the eccentrically located roller 132 in the slot 133 to raise and lower the tube 134.

I may use for the remainder of the sound conveyer the structure as illustrated in Fig. 6, if desired, or I may substitute for the casting 57 the plain elbow casting 135 with

its lower end 136 rigidly secured in the upper end of the telescoping tube 134 as by brazing or soldering. Extending from the lateral arm of the elbow 135 is the tube 137 provided at its forward end with an apertured guide or support plug 138. Within this tube 137 and rotatably secured in the elbow 135 is a short section of tube 139 slotted as at 140 for about one half of its circumference to receive the limiting screw 141 whereby the rotation of the section of the tube 139 upon its axis may be limited to about 180 degrees. Extending through the apertured plug 138 and into the free end of the section 139 is the curved sound box tube 142 similar in all respects to the tube 71, as illustrated in Figs. 2 and 6. I provide a lateral aperture 143 in the tube 137 so that access may be had to the screw 144 which rigidly connects the tube 142 with the tube 139.

As a means for supporting the telescoping sound conveyer structure as just described, I provide the supporting bearing pin 145, extending the same axially through the tube 134 down through the turn in the tubular standard 125, as clearly illustrated in the figure with the lower end of said bearing pin 145 located in position to be supported by a bracket similar in all respects to the bracket 81. The upper end of the pivot pin 145 projects into an offset bearing 146, at the upper turn of the elbow 135 so that the telescoping part of the second conveyer, as described, is practically supported upon its bearing pin 145 and is guided in its oscillation by the tubular standard 125. As above indicated the elevation of the telescoping parts thus described through the medium of the stub shaft 127 will operate to elevate the sound box and its needle clear of the phonograph record in substantially the same manner as described in connection with the automatic electrical stop and elevating mechanism. It is to be understood that the amplifying conveyer 53 is to be connected to the lower end of the tubular standard 125 in substantially the same manner as the amplifying conveyer hitherto described, is connected to the standard 49.

As a slightly further modified form of the sound conveyer tube I may provide the structure as illustrated in Fig. 18. In this case the only difference in the structure of the modification over that as illustrated in Fig. 6 resides in the sectional sound conveyer tube 146 which is uniform in diameter throughout its length, but made sectional with the parts 147 and 148 connected together by a union 149. The outer end of the section 147 is curved in the same manner as the conveyer tube 71 is curved as illustrated in Fig. 2. It may be stated here that the purpose of making this conveyer tube in section rather than as a single piece is solely for convenience in assembling. With the curved end of the



tubular conveyer at the one end and the plug structure at the opposite end it is found inconvenient as a manufacturing proposition to assemble the parts and therefore they are made in the various forms as above described and illustrated in the several figures of the drawings which illustrate actual structural forms rather than preferred and modified forms.

In Figs. 19 and 24 I have shown a form of closure for the sound amplifying conveyer 54. This consists in a trap door 149' hinged at the bottom by a special form of hinge which permits the door to be swung open to the limit illustrated in Fig. 24 or partially closed and held in any angular position between the two positions as illustrated in Figs. 19 and 24. It will be noted that the door opening is flared out as at 150 all the way around and the door 149' is constructed to closely fit this flared out opening. The hinge 151 for the door is provided at the bottom and is of special structure which I will now proceed to describe. It consists of the two sections 152 and 153 pivoted together by means of a pivot pin 154 and respectively connected to the lower edge of the opening 150 and to the door 149'. The section 152 consists of the bottom portion 155 and the lateral apertured cheek pieces 156. The apertured ends of these cheek pieces extend over somewhat so as to provide for the open ended slots 157. The section 153 comprises the flat fastening element 158 and the cylindrical protecting section 159 with the lateral apertured cheek pieces 160. These cheek pieces extend forward as shown so that when in position they lie against the outer sides of the cheek pieces 156 of the other section. The pin 154 passes through the registering apertures in the cheek pieces 156 and 160, with a spring 161 located thereon, said spring being considerably compressed so as to bear upon the inner faces of the cheek pieces 156. The section 152 being made of spring metal the effect of the spring 161 upon the cheek pieces 156 is to press them outwardly into closer frictional engagement with the inner face of the cheek pieces 160, so that the structure constitutes a friction hinge of such a nature that the door 149 may be adjusted to any position from closed to widely open with the result that any degree of amplitude of sound may be emitted from the sound amplifier within the limits of the instrument.

I have shown in Figs. 14 and 15, the sound box designated for use in connection with the phonograph as described. This sound box forms the subject matter of another application, but is described here merely for the purpose of giving a better understanding of the parts. This sound box consists of a circular plate as 165 having the circular flange 166 and the central aperture 167. Into this

aperture is rigidly inserted the connecting tubular thimble 168 which connects the sound box proper with the curved end of the conveyer tube 71. Secured to the face of the plate 165 by means of the screws 169 is the flanged clamping ring 170 having a cut away center so as to provide the inwardly projecting flange 171 which serves to hold the two gaskets 172 and 173 in place, with the diaphragm 174 therebetween. The clamping ring 170 is provided with a lateral projection 175 which latter has the outwardly projecting apertured lugs 176 for carrying the stylus holder pivots 177. The stylus holder consists of a piece of sheet metal blanked to shape and provided with means for connection with the center of the diaphragm and lateral spring lugs 178 which bear against the inner points of the pivot pins 177. A tubular extension 179 carries the stylus socket 180 into which is inserted the stylus needle 181, the same to be held in position by means of the set screw 182.

I have shown in the various figures, a spring 190 located on the under side of the cover 2 and bearing upon the bell crank stop lever for normally giving said lever a bias to hold the starting pin in its elevated position, and also to hold the lower end of said bell crank 108 in position to snap into engagement with the notch in the arm 97'. This is to be used in addition to the spring 191 which is mounted upon the pivot of said lever, if desired.

In Figs. 25 and 26 I have shown a form of my invention whereby the sound box and conveyer tube swings in a fixed horizontal plane, parallel to the plane of the record supporting table 24 with means for raising and lowering said table into and out of contact with the stylus or reproducing needle 181. The general features of this latter structure are identical with those illustrated in the preceding figures with however, such changes made as are necessary to raise and lower the record support. In this form, inasmuch as the sound box is to swing in a fixed horizontal plane, it is unnecessary to provide means for raising and lowering the tube 55. The casting 57 is such that it may rest and swing upon the tubular standard 49 substantially as illustrated in Fig. 6. The lower end of the tube 55 projects below the lower end of the tubular standard 49 and carries upon it the frictional swing arm 79 for contact with the contact strip 118. This arm however, is somewhat shorter than that illustrated in Fig. 9, so that it may clear all of the parts which might otherwise interfere with its free movement. The contact piece 118 is also moved forwardly toward the center of rotation of the arm so as to bring it within the sweep of said arm in order to establish the circuit heretofore referred to. In order to provide for the raising and low-



ering of the record support, I make the supporting shaft 22 vertically slidable in the upper and lower motor plates 4 and 5, with the pinion 21 mounted upon said shaft of a much wider face to provide for the range of movement of the shaft. The table driving shaft 22 is supported by means of a vertically sliding plug 201 carried in a socket 202, mounted in axial alinement with the shaft upon the under side of the plate 5. This socket is provided with a screw threaded cap 203 having an aperture 204 smaller than the central aperture of the socket, and the plug is shouldered and provided with a reduced external portion 205 extending through the aperture 204 in the cap. On the under side of the plate 5, I secure a bracket 206 which has a vertical arm for supporting the shifting lever 207. This lever has one of its arms projecting forwardly with its extremity just below the reduced portion 205 of the plug 201, and the other arm extending on the other side of its pivot to form a kind of toggle connection with the arm 208 secured to the rock shaft 92. The remaining mechanism is substantially the same as illustrated in the other figures and need not be further described. The operation of this structure is as follows: The depression of the starting button or push pin 100 will oscillate the rock shaft 92 and thus tilt the lever 207 to raise the plug 201 and with it the record supporting shaft 22, so as to raise the record up for engagement with the stylus needle 181 of the sound box and away from the brake 104, 105, the sequence of operation being such that the brake is first left behind by the record support, and next the surface of the record itself will come in contact with the point of the stylus needle. The record support 24 under these circumstances will carry the record into contact with the stylus needle and being free from the brake underneath, it will rotate under the impulse of the motor spring. It is to be understood in this connection that the bell crank 108 with its vertical arm will engage the stop arm 97' mounted upon the rock shaft 92 and thus hold the parts in position until the stylus needle shall have accomplished the limit of its travel, when of course electrical contact will be made by the arm 79 with the contact piece 118, and the circuit being established, the vertical arm of the bell crank lever 108 will be drawn away by the magnet through the link 116', when the spring 87 will oscillate the rock shaft and in turn, oscillate the shifting lever, and the record support with its shaft will fall by gravity, so as to break contact between the record upon the support with the needle. I regard this latter form as a very valuable form which the invention may take and therefore desire to cover the same broadly along with the form

described in the earlier part of this specification.

I claim,

1. In a phonograph, a sound box, a record support, means for separating said sound box from said record support, comprising a sound conveyer tube having telescoping sections, and automatic mechanism for positively sliding one of said sections axially within another section thereof at any predetermined point in the playing of a record.

2. In a phonograph, a sound box and a sectional sound conveyer tube, and automatic means for telescoping one section of said tube into another section thereof to separate the sound box from the record being played at any predetermined point in the playing thereof.

3. In a phonograph a metallic sound conveyer tube, a support for said tube in which it may oscillate upon its axis, a plug in the end of said tube, said plug being provided with a shouldered flange, and a lug upon said support, said lug having a stop thereon for coöperation with the shoulders of said flange and an overhanging projection for retaining said tube in said support.

4. In a phonograph, a sound conveyer tube, a support in which said tube may oscillate upon its axis, a sound directing plug inserted in the end of said tube, a flange upon said plug, said flange being provided with a pair of substantially diametrically located shoulders, and a lug secured to said support and overhanging said flange for coöperating with said shoulders to limit the oscillation of said tube and for preventing the accidental displacement of said tube from said support.

5. In a phonograph, a record tablet support, a rotatable shaft upon which said support is mounted, a bearing flexibly secured to said support and means for rigidly but detachably securing said bearing to said shaft.

6. In a phonograph, a disk record tablet support having a central aperture therein, and a center bearing flexibly secured to the center of said support and projecting through said aperture.

7. In a phonograph a detachable disk record tablet support having a central aperture therein, and a flanged center bearing projecting through said aperture and flexibly secured to said support from the lower face thereof.

8. In a phonograph, a detachable record tablet support having an aperture in the center thereof, a center bearing projecting through said aperture and a laterally yielding spring permanently connecting said bearing to said support.

9. In a phonograph, a detachable record



tablet support having a central aperture therein, a flange upon said support surrounding said aperture, and a centrally apertured center bearing permanently yet flexibly secured to said support in the central aperture thereof.

10. In a phonograph, a sound box, and a stylus needle therefor, a record tablet support, a motor for rotating said support when said stylus needle bears upon a record carried by said support, electrically released spring actuated mechanism for separating said record and support from said needle, and stop mechanism actuated by the release of said spring mechanism for stopping the rotation of said record tablet support.

11. In a phonograph a sound conveyer, a sound box secured to and in communication with said conveyer, a needle secured to said sound box, a rotatable disk record support, a motor for rotating said support, electrically released spring actuated mechanism for raising said sound box and its needle out of contact with a sound record carried upon said support, and a stop mechanism actuated by said spring mechanism for stopping said motor, said electrically released spring mechanism being actuated by a pre-determined travel of said sound box and its needle across a record upon said support.

12. In a phonograph, a sound box and its stylus needle, a sectional telescoping sound conveyer tube and electrically released spring operated means for extending said tube to separate the sound box and its stylus needle from the record being played at a predetermined point in the playing thereof.

13. In a phonograph, the combination of a sound box and its stylus needle with a sectional extensible sound conveyer tube, means for contracting said tube to cause the stylus needle to bear upon the record to be played, and electrically released spring operated means for extending said tube to cause said stylus needle to be raised free from the record at a predetermined point in the playing thereof.

14. In a phonograph, a sound conveyer tube of uniform diameter pivotally mounted to oscillate upon its own axis, the free end of said tube being bent substantially into a quadrant, a swinging support for said tube, a shouldered plug in the other end of said tube, a stop upon said support for coöperation with said shouldered plug to limit the oscillation of said tube and means for connecting a sound box to the bent extremity of said tube.

15. In a phonograph, a record support consisting of a rotating disk or table, a tubular oscillating sound conveying arm capable of limited free movement in a plane parallel to the plane of said record support, elec-

trically released spring operated means governed by the movement of said arm for relatively moving said sound conveying arm and said support away from each other, and a sound box with a stylus needle secured to said arm for coöperation with a sound record carried by said support.

16. In a phonograph, a metallic sound conveyer tube, a swinging supporting arm through which said tube projects and in which it may oscillate upon its axis, the free end of said tube being bent upon a quadrant curve, a sound directing plug having a shouldered flange thereon inserted into the opposite end of said tube and a lug upon said supporting arm for coöperating with the shoulders of said flange for limiting the oscillation of said tube to a predetermined degree of angularity.

17. In a phonograph, a record support, a cylindrical metallic sound conveyer tube, a swinging supporting arm in which said tube may both oscillate upon its axis and with which it may swing in a plane parallel to the plane of said record support, a sound directing plug having a flange thereon, provided with shoulders, said plug being inserted into said tube and a lug upon the end of said supporting arm for coöperating with the shoulders upon said flanged plug to limit the axial oscillatory movement of said tube.

18. In a phonograph, a rotating disk record support, a sound conveyer tube pivotally mounted to oscillate in a plane parallel to said record support, and electrically released spring operated means upon said phonograph for shifting the plane of oscillation of said sound conveyer tube.

19. In a phonograph, a sound conveyer tube, a supporting standard in which sound conveyer tube may vertically slide, and horizontally oscillate and an electrically released spring actuated means for vertically sliding said sound conveyer tube within said standard.

20. In a phonograph, a sound conveyer consisting of a pair of tubular sections connected together at right angles to each other, a tubular standard in which one of said sections is mounted to slide vertically and rotate horizontally upon its axis and electrically released spring actuated mechanism for sliding said section within said tubular standard.

21. A sound conveyer tube for phonographs comprising two tubular sections connected together with their axes at right angles to each other, a tubular standard in which one of said sections is mounted for limited oscillation upon its own axis, and electrically released spring operated means for reciprocating said last named section within said tubular standard in the direction of its axis upon a predetermined degree of oscillation thereof.

70

75

80

85

90

95

100

105

110

115

120

125

130



22. In a phonograph, the combination with a rotating drive shaft having a bearing support thereon, with a sleeve for frictional engagement with said bearing support, and  
5 a record supporting disk resiliently connected to said sleeve.

23. In a phonograph, the combination of a record driving shaft having a bearing support thereon, a bearing sleeve having a conical bore for frictional engagement with said  
10 bearing support, and a record tablet support flexibly connected to said bearing sleeve.

24. In a phonograph, the combination of a vertical driving shaft, a conical bearing support upon the free end of said shaft, a  
15 sleeve having a conical bore therethrough for frictional engagement with said conical bearing support, a flange upon one end of said sleeve and a collar screw threaded upon the opposite end of said sleeve, and a record  
20 tablet support resiliently mounted upon said sleeve between said flange and said collar.

25. In a phonograph, the combination of a vertically disposed driving shaft, a conical bearing support upon the upper end of said  
25 driving shaft, a bearing sleeve having a conical bore therethrough designed for frictional engagement with said conical bearing support, a flange upon one end of said sleeve, and a collar screw threaded upon the  
30 other end of said sleeve, a record supporting disk and a spring between said collar and said flange for resiliently holding said supporting disk against said flange.

35 26. A record tablet supporting disk for phonographs, comprising a centrally apertured tablet supporting disk, and a bearing sleeve flexibly mounted in the aperture of said disk.

40 27. A rotating table or tablet supporting disk for phonographs, comprising a centrally apertured disk, a flange surrounding said central aperture, a flanged bearing sleeve or thimble projecting through said aperture  
45 in frictional engagement with the flange thereof, and resilient means for holding said sleeve or thimble in flexible engagement with said tablet supporting disk.

50 28. In a phonograph, a record tablet supporting disk, means for rotating said disk in its own plane, a sound box, a sound conveyer tube supporting said box and capable of oscillation in a plane parallel to the face of said supporting disk, and electrically re-

leased spring operated stop mechanism governed by the oscillation of said sound conveyer tube for shifting the plane of oscillation of said sound conveyer tube, and thereafter stopping said rotating means.

29. In a phonograph, the combination of a  
60 record tablet supporting table, a spring motor for rotating said table, a sound box with a sound conveyer tube for supporting said box, said sound conveyer tube having a horizontal arm capable of oscillating in a plane  
65 parallel to the surface of said supporting table, said sound conveyer tube also having a vertical tubular portion, a tubular standard for supporting said conveyer tube and sound box, manually operated means for raising and  
70 lowering said sound conveyer tube in said tubular standard, and automatic means for causing a predetermined angularity of lateral oscillation of said conveyer tube to raise said conveyer tube and thereafter to  
75 stop said motor.

30. In a phonograph, a sound box, a record support, automatic means for separating said sound box from said record support, comprising a sound conveyer tube having a  
80 vertically sliding section, a spring for elevating said section, a detent for holding said spring under compression to lower said section, and electrically actuated means for releasing said detent to permit said spring to  
85 raise said section and said sound box from said record support.

31. In a phonograph, a horizontal sound conveyer tube, a tubular support in which said sound conveyer tube may oscillate upon  
90 its axis, a shouldered plug in one end of said sound conveyer tube and a lug upon said support for coöperation with said shouldered plug to limit the oscillations of said conveyer tube.

32. A talking-machine including in its construction a rotary spindle, a socket member fitted upon said spindle and having a flange, a record carrier loosely mounted upon said socket member below the flange,  
100 and a spring for pressing the record carrier against the said flange.

In testimony whereof I have hereunto set my hand this 23rd day of April, 1912.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,

W. B. WALTZINGER.



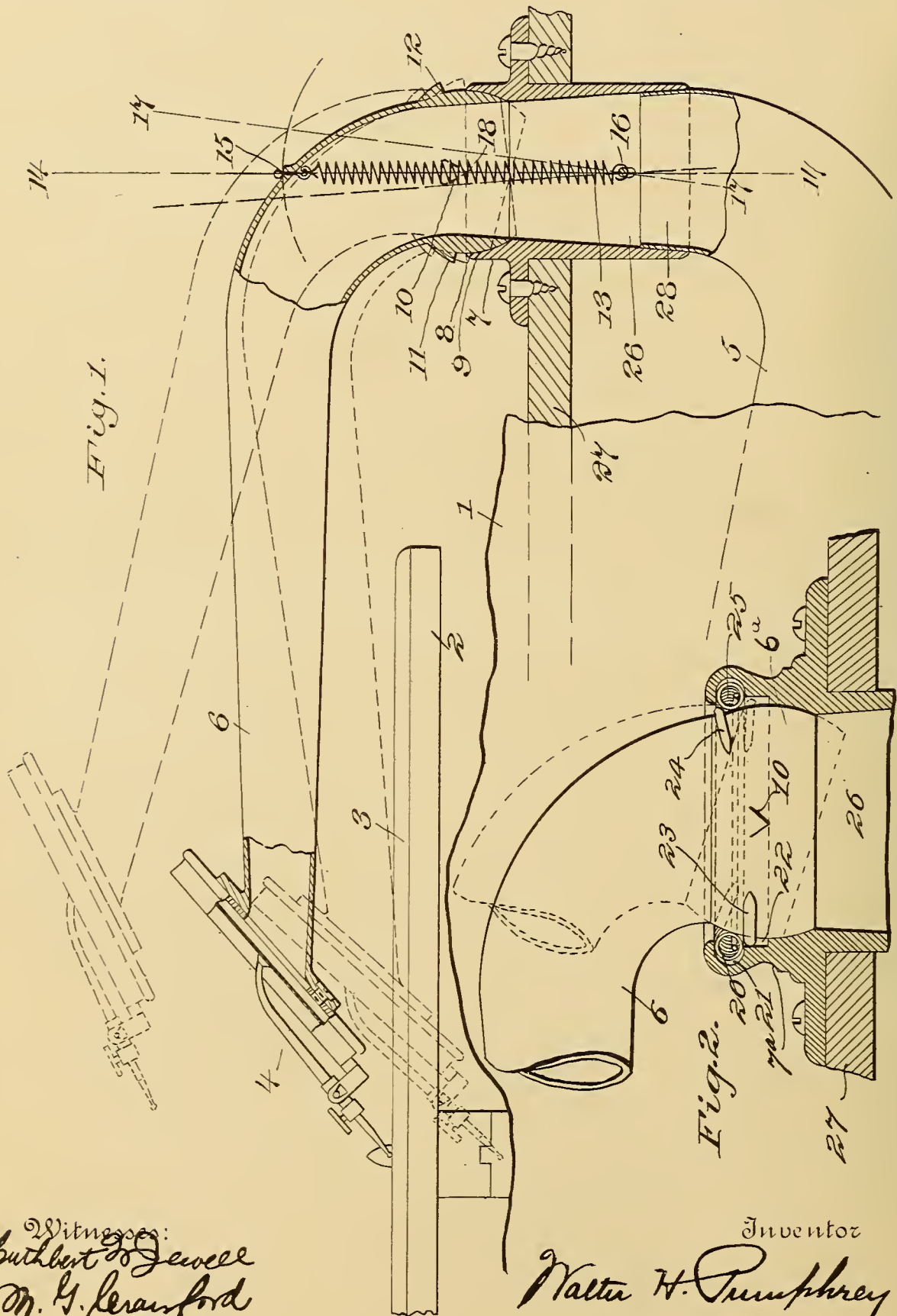




W. H. PUMPHREY.  
TALKING MACHINE.  
APPLICATION FILED MAR. 17, 1911.

1,087,256.

Patented Feb. 17, 1914.



Witnesses:  
Cuthbert D. Jewell  
M. G. Crawford

Inventor  
Walter H. Pumphrey



# UNITED STATES PATENT OFFICE.

WALTER H. PUMPHREY, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## TALKING-MACHINE.

1,087,256.

Specification of Letters Patent.

Patented Feb. 17, 1914.

Application filed March 17, 1911. Serial No. 615,018.

*To all whom it may concern:*

Be it known that I, WALTER H. PUMPHREY, a citizen of the United States of America, residing at New York city, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates generally to talking machines and more particularly to the construction and mounting of the sound-conveying tube or tone-arm employed in connection with such machines.

The object of the invention is to simplify the construction and dispense with small parts in mounting the tone-arm and at the same time give it the required freedom of movement in planes parallel and at right angles to the surface of the record.

The accompanying drawings will serve to illustrate several forms suitable for carrying my invention into effect. I wish it understood, however, that I do not limit myself to the exact constructions shown in the drawings, as various changes may be made therein within the meaning of the present invention.

In the drawings, Figure 1 is a view in elevation, partly in section, showing the application of my improved form of mounting to a modern talking machine. Fig. 2 is a detail sectional view illustrating another form which my invention may assume.

Referring to the drawings, 1 represents a portion of a casing or cabinet in which the machine is usually contained.

2 is a rotating table, carrying a sound record of the disk type. Coöperating with the record there is a reproducing sound-box 4, from which a sound-conveying tube or tone-arm leads and serves to connect the sound-box or reproducer with a horn 5.

As the novelty of the present invention lies in the construction and mounting of the tone-arm, the description will be confined to that feature, which is adapted for use with many types of machines other than that here illustrated. The tone-arm, as shown, is a sectional arm, consisting of two parts or members 6 and 7. The member 6 or main section thereof may be of uniform internal

diameter throughout its length, if desired, but is preferably tapered and has its rear end shaped externally as part of a true sphere, as indicated at 8, which shaped or spherical portion is designed to seat in a similarly shaped bearing 9, formed in the open end of the second section 7 of the arm, the arrangement being such, as to form, in effect, a ball and socket joint between the tone-arm sections, permitting free motion of the main section 6 thereof, in planes at right angles to each other or parallel and at right angles to the surface of the record. The main section 6 is maintained upright or against slipping or falling sidewise, by oppositely disposed side lugs 10, which bear on the upper edge of the section 7. The vertical movement of the main section is likewise limited by front and back lugs 11 and 12 which, when the sound-box or reproducer is raised or lowered, as indicated by dotted lines in Fig. 1, co-act with the upper edge of the section 7.

Heretofore, a spring catch of suitable form has been employed to yieldingly hold the sound-box elevated above and clear of the record, and it is one of the objects of the present invention to dispense with the use of such a catch, as a separate device, and cause its function to be performed by a member or part below referred to, in addition to the main function of such part.

The main section of the tone-arm, mounted as above described, rests by its own weight in the spherical seat or bearing provided in the adjoining section 7 and in order to operatively connect these sections in assembled relation, a helical or other suitable form of spring 13 is secured, preferably in the line 14, 14, of the vertical axis of the section 6, one end of the spring being attached to the section 6 at the point 15 and the opposite end thereof to a cross pin 16 of the section 7. The manner of attaching the spring may be varied and suitable provision made to avoid torsional action as the tone-arm swings about its vertical axis.

Normally, that is when the sound-box is coöperating or in position to coöperate with the record, the spring is practically dead so far as its influence on the sound-box is con-



cerned, as its pull is in the line of centers, indicated by the vertical turning axis 14, 14, and while it draws the main section of the tone-arm into close contact or engagement with its bearing in the section 7, it does not in anywise appreciably limit or affect the freedom of movement of the sound-box. If, however, it is desired to yieldingly hold the sound-box against the record, this may be readily done by attaching the upper end of the spring somewhat to the left of the vertical axis 14, 14. When the sound-box or reproducer is swung upward, clear of the record, to the dotted line position indicated in Fig. 1, with the rear stop lug of section 6 engaging the edge of the section 7, the pull of the spring will be in the line 17, 17, to the right of the horizontal turning axis 18, and being thus shifted to one side of the center (18) the spring will yieldingly maintain the sound-box in the position described, performing this function, for which a spring catch is ordinarily employed, as above stated, in addition to its main function of operatively connecting the tone-arm sections.

While I have shown only one spring, it will be understood that two or more may be employed if desired and arranged in various ways to produce the result described.

In the modification illustrated in Fig. 2, the helical spring is in the form of a ring 20, having an internal diameter somewhat less than the greatest external diameter of the spherical end of the tone-arm section 6 and so arranged in an annular seat 21 in the section 7<sup>a</sup> as to yieldingly oppose entrance therein of such spherical portion of the section 6<sup>a</sup>. The section 7<sup>a</sup> is counter-bored to provide an annular shoulder 22, corresponding to the upper edge of the spherical bearing and on which the side lugs 10 rest, as in Figs. 1 and 2. Front and rear lugs 23 and 24 are employed, as above described, to limit the vertical swing of the section 6 carrying the sound-box but in this instance, the lugs co-act directly with the spring to maintain the sound-box above and clear of the record, as indicated by dotted lines in the figure (3). The sections, in this form of the invention, are assembled by forcing the spherical end of section 6<sup>a</sup> through the spring ring in section 7<sup>a</sup>. Under this pressure, the ring expands and permits passage of the spherical portion to its bearing below and immediately thereafter the spring ring contracts, yieldingly gripping the section 7<sup>a</sup> and acting to force it downward to a bearing in the seat below. The front lug 23 also passes through the spring ring and in co-acting with the annular shoulder 22 positively limits downward movement of the sound-box. When the sound-box is swung upward to the position indicated by dotted lines, the front lug is forced upward and the rear lug

downward through the spring ring, which latter yieldingly opposes the return thereof to normal position and thereby maintains the sound-box elevated above and clear of the record. Excessive upward movement of the sound-box which would tend to disconnect the sections of the tone-arm, is prevented by the rear lug 24, which co-acts with the annular shoulder, and positively limits such excessive movement. To prevent the spring ring being accidentally forced out of the annular containing groove, a ring of wire may be employed in connection therewith, as indicated at 25, such wire ring being preferably of slightly greater diameter than the opening at the upper end of the section 7<sup>a</sup>.

The section 7 of the tone arm is preferably secured fast to the casing of the machine and has a depending portion 26 which projects downward through an opening in a partition 27, to receive the small end 28 of the horn, or connect with other suitable sound amplifying means.

The operation, manner of assembling and disconnecting the parts, as well as the many important advantages of the invention will be apparent from the foregoing description.

Having, therefore, described my invention, I claim:

1. In a talking machine, the combination of a hollow tone-arm composed of a plurality of sections united by a universal joint, whereby one section is capable of moving both vertically and horizontally with relation to the other section, and an interior spring acting to hold the movable section in both operative and elevated position.

2. In a talking machine, a tone-arm composed of a plurality of hollow sections united together by a universal joint whereby one of the sections is capable of movement both vertically and horizontally with relation to the other section, and an interior spring reacting between the sections to hold them together and to retain the movable section elevated when adjusted into that position.

3. In a talking machine, a tone-arm composed of a plurality of hollow sections united by a universal joint whereby one of the sections is capable of movement around vertical and horizontal axes with relation to the other section, and a spring within the hollow sections connected to each of the sections and normally lying within the vertical axis of the movable section, whereby said spring holds the sections together, and also holds the movable section in either the operative or elevated position, as it may be adjusted.

4. In a talking machine, a tone arm composed of a plurality of hollow sections united by a universal joint whereby one of the sections is capable of movement around

vertical and horizontal axes with relation to  
the other section, and a spring within the  
hollow sections lying within the vertical  
axis of the movable section and having one  
5 end connected to said movable section and  
the other end to said stationary section  
whereby said spring holds the sections to-

gether and also holds the movable section in  
either the operative or elevated position as  
it may be adjusted.

WALTER H. PUMPHREY.

Witnesses:

CUTHBERT W. JEWELL,  
M. G. CRAWFORD.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

---





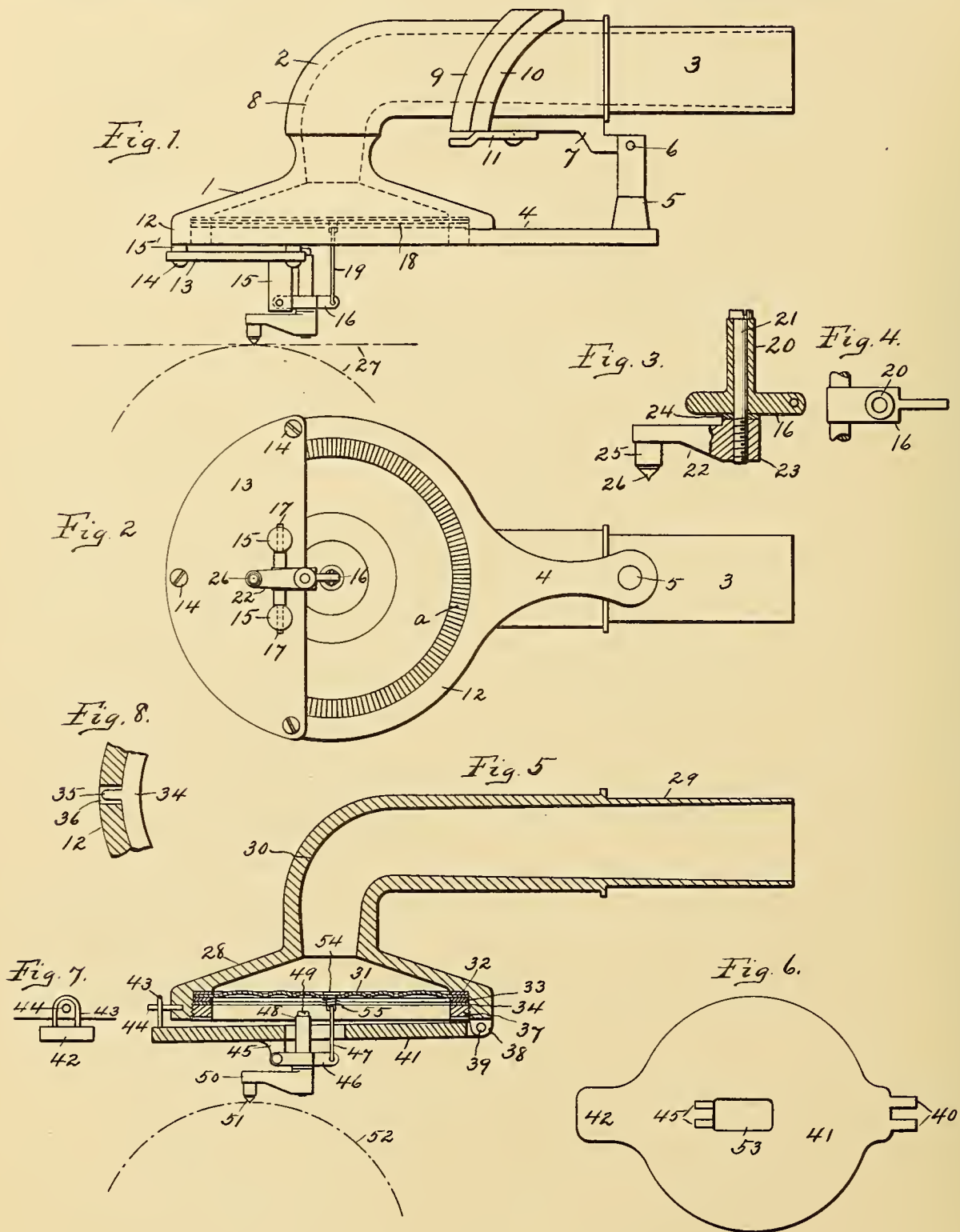


P. WEBER.  
SOUND BOX.

APPLICATION FILED FEB. 3, 1913.

1,087,339.

Patented Feb. 17, 1914.



Witnesses:  
P. L. Green.  
Wm. Martin

Peter Weber Inventor  
By *Louis M. Sanders* Attorneys



# UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY.

## SOUND-BOX.

1,087,339.

Specification of Letters Patent.

Patented Feb. 17, 1914.

Application filed February 3, 1913. Serial No. 745,773.

*To all whom it may concern:*

Be it known that I, PETER WEBER, a citizen of the United States, residing in the city of Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

In the manufacture of phonograph records as carried on by modern processes, it frequently happens that the record groove is slightly distorted; that is to say it does not follow a theoretically correct helix around the surface of a cylindrical record, or a correct spiral around the face of a disk record. The best practice in phonograph construction requires that the sound boxes be mounted rigidly against lateral movement and that the box body be pivoted to oscillate in a plane perpendicular to the axis of the cylindrical record or to the plane of the disk record; or to provide means whereby the stylus may oscillate in a vertical plane where the entire sound box is held against movement in any direction. Unless some provision is made for a slight lateral movement of the stylus under the conditions above named, the stylus itself will not track properly in the record groove, with the result that the disagreeable scratching and the jumping of the stylus from the one groove to the next will take place.

The purpose of my invention is to provide the stylus and its connection with the diaphragm of the sound box with means whereby said stylus may oscillate laterally and thus be caused to follow the record groove no matter how distorted such grooves may be or how unevenly the mandrel upon which the record is mounted may run. The structure whereby I accomplish this result is applicable to either form of sound box; that is to say that form in which the sound box is permitted to oscillate bodily toward and away from the record, or that form in which the sound box is held rigidly against movement in any direction. I have therefore shown my invention as applied to both forms of sound boxes and in the following description the full details of so much of said sound boxes will be set forth as will enable persons skilled in the art to which my invention pertains, to make, construct and use the same.

In the accompanying drawings forming a part of this specification, Figure 1 is an enlarged side elevation of a sound box and

its connection, designed to oscillate about a pivot in a plane perpendicular to the axis of a cylindrical record. Fig. 2 is a bottom plan view of the same. Fig. 3 is a detached vertical section through the stylus arm bearing and stylus lever. Fig. 4 is a plan view of the stylus lever showing the tubular bearing for the stylus arm. Fig. 5 is a vertical section of a sound box which is designed to be held rigidly fixed. Fig. 6 is a bottom plan view of the floating weight. Fig. 7 is an end view of the connection between the floating weight and the sound box body. Fig. 8 is a view partly in section of the sound box body and the metallic retaining washer for the gaskets.

Similar reference numerals refer to like parts throughout the specification and drawings.

The structure shown in Fig. 1 is of the type wherein the sound box body is designed to oscillate in a plane perpendicular to the axis of the phonograph record. It consists of the box body 1, with the elbow 2, and the connecting thimble 3. The box body is provided with a rearward extension 4, rigidly connected to said body and provided with an upwardly extending post 5, the latter being provided at its upward end with a pivot bearing 6. Rigidly connected to the lower side of the thimble 3, is a lug or bracket 7, to which the post 5, is pivoted at 6. The sound conveying passage 8, (shown in dotted lines) extends from the interior of the sound box body through the elbow 2, and communicates with the interior passage in the thimble 3. In order that this communication may be continuous and unbroken I provide the elbow 2, with a cylindrical faced flange 9, at its outer end, and the thimble 3, with a corresponding flange 10. The cylindrical contacting faces of said flanges are struck upon the pivot 6, as an axis. It will thus be seen that the sound box body 1, may oscillate about the pivot 6, without necessarily breaking the sound conveying passage 8, from the sound box 1, to the thimble 3. In order to limit this oscillation I secure to the under side of the bracket 7, a short limiting lug 11, the end of which projects into the path of the flange 9. The upward oscillation of the sound box, of course will be limited by the contact of the end of the limiting lug 11, with the upper face of the sound box body.

The diaphragm and the means for retain-



ing the same within the sound box are shown in detail in Fig. 5, and need not be here described.

Upon the flange 12, of the sound box, I secure the segmental plates 13, by means of the screws 14. The spacing washers 15', are located upon the screws 14, between the upper face of the plate 13, and the lower face of the flange 12. Upon the plate 13, are two downwardly extending posts 15—15 spaced apart and located as shown in Fig. 2. These posts serve as bearings for the T-headed stylus lever 16, the pivots 17, of which extend through apertures provided therefor, of the lower ends of the posts 15. The outer end of the stylus lever is connected to the diaphragm 18, by means of the link 19. The stylus lever 16, is shown in vertical section in Fig. 3, and in plan in Fig. 4, to which reference is now made. From the upper side of said lever 16, there extends a tubular bearing 20 of considerable length. Extending downwardly through said bearing is the headed supporting pin 21, to the lower end of which is rigidly secured the stylus arm 22. Between the hub 23, of said stylus arm and the under side of the stylus lever is located the bearing washer 24. Upon the free end of the stylus arm 22, is located the cup 25, to receive the jewel stylus 26.

The structure as thus far described permits a free oscillation of the stylus arm 22, and its stylus 26, about the vertical axis formed by the supporting pin 21, and yet the connections are such that any vertical movement of the stylus 26, due to its travel in the record groove of a phonograph record will be communicated through the stylus arm 22, the stylus lever 16, the link 19, to the diaphragm 18. Any lateral distortion of said record groove will be taken care of by lateral oscillations of the stylus arm 22, and will not be communicated to the diaphragm. Any uneven running of the mandrel upon which the record 27, is mounted will be taken care of by the vertical oscillation of the sound box 1, about its pivot 6.

In Fig. 5, I have shown my improvement as applied to a rigidly fixed sound box through the means of the well known floating weight. In this structure, sound box 28, is of any usual or preferred type and is provided with the connecting thimble 29, through which the sound conveying passage 30 communicates with the sound box body. The diaphragm 31 may be of any usual or preferred type. The one shown in the drawing is of the corrugated metallic disk type well known in the art. This diaphragm is supported within the sound box at its margin between the two gaskets 32 and 33, upon the latter of which is located a metallic retaining washer 34, having at one point therein an outwardly projecting

tang 35 which extends into an aperture 36, in the flange of the sound box as shown in Fig. 8. The retaining ring 37 is screwed into the flange of the box 28, its outer face being corrugated as shown at "a" Fig. 2 to facilitate its being turned by the fingers. The retaining washer 34 is inserted between the retaining ring 37, and the gasket 33, so that when said retaining ring 37 is screwed home it will not have a tendency to wrinkle the gasket 33, as would be the case if said gasket were in direct contact with the ring 37.

The pivot lug 38, projects downwardly from the flange of the box 28, as shown in Fig. 5, for the purpose of receiving the pivot pin 39, which latter passes through apertures in the pivot lugs 40, of the floating weight 41. The opposite end of the floating weight 41 is provided with an extension 42, from the upper side of which extends a staple 43; which takes over a pin 44, projecting laterally from the flange of the box body 28. This permits the floating weight to oscillate vertically about the pivot pin 39 to a limited extent. From the under side of the floating weight 41 projects the two pivot lugs 45—45, between which is pivoted the stylus lever 46. This stylus lever is substantially the same in all its details as that shown in Fig. 3, to which reference is made for such details. The outer end of the stylus lever is connected to the center of the diaphragm 21 by means of the link 47. It is also provided with the tubular bearing 48, within which is the pivot pin 49 carrying at its lower end the stylus arm 50, which latter may oscillate in a horizontal plane with its stylus 51 bearing in the record groove of a phonograph record 52. In order to provide space for the free movement of the tubular bearing sleeve 48 without contact with any part of the floating weight 41, I provide an aperture 53 in the center of said weight through which said bearing sleeve 48 may project. The link 47 also extends through said aperture 53, and its connection with the center of the diaphragm is accomplished in the following manner: In the center of the diaphragm is a headed pin or stud 54 which extends through an aperture in the diaphragm provided therefor and is provided at its outer end with an aperture through which the upper end of the link 47 is hooked; between the upper end of the link 47, and the lower face of the diaphragm is located a small coiled spring 55, which latter serves to prevent any rattling between the link 47 and the aperture stud 54.

It will thus be seen that I have provided a sound box wherein the stylus is permitted to follow the record groove of a phonograph record, even though such groove may be distorted to a considerable degree out of the



theoretically correct helix, while at the same time the construction is such that the vertical oscillations of the stylus due to its rising and falling upon the elevations and excavations of such record groove will be faithfully communicated through the connections to the diaphragm; in other words the stylus and its connections are laterally flexible but vertically rigid when in use.

Frequent endeavors have been made to accomplish the same result by making the pivot bearings of the stylus lever comparatively loose but this can only result in the inaccurate transmission of the sound waves generated by the record groove to the diaphragm and the improper rendition of the selection, due to the fact that the stylus itself wobbles about in the record groove and is not always presented to the elevations and excavations therein at exactly the same angle. I have found in practice, that part at least of the disagreeable scratching is due to the stylus leaving the record groove and traveling upon the elevated cylindrical surface of the records between the consecutive grooves. The lateral flexibility of my improved stylus arm prevents this, and it also prevents the stylus from jumping from one groove to its neighbor when the record groove itself is distorted slightly out of the theoretically correct helix.

It is not necessary with the construction above described and illustrated in the drawings that the phonograph upon which the sound box is mounted shall be perfectly level. In fact such conditions are met with when the phonograph is upon a boat which may rock and thus throw the phonograph out of level at various times. Under such conditions the swinging of the phonograph itself from side to side, during such rocking motion, will cause the sound box to move slightly in its bearings or connections, with the result that the stylus may jump from one record groove into its neighbor. This is due entirely to the inertia of the sound box body and the usual connections between said box body and the frame upon which it is mount-

ed. Such conditions are entirely overcome in the structure above described for the reason that the box body is rigidly mounted in the one case, and mounted to oscillate in a plane perpendicular to the face of the record in the other case. Under these conditions it is only the very small stylus arm which may oscillate laterally and its inertia is so slight as to be readily overcome, or taken care of by the lateral walls of the record groove; in other words there is no liability whatsoever for the stylus to jump from one record groove to the next no matter to what degree the phonograph upon which the sound box is mounted may itself rock or oscillate.

I claim:

1. In a sound box, the combination of a box body, a diaphragm mounted therein, a floating weight hinged to said box body, a stylus lever pivoted at one end to said floating weight and having a link connection at its other end with said diaphragm, a tubular bearing extending from the upper side of said lever, a headed bearing pin extending through and supported by said tubular bearing, and a stylus arm rigidly secured upon the lower end of said pin and constrained thereby to swing in a plane parallel to said diaphragm.

2. A stylus mounting for phonograph sound boxes comprising a stylus lever having laterally extending supporting pivots at one end thereof, a tubular bearing extending from the upper side of said lever a headed bearing pin extending through and supported by said tubular bearing, and a stylus arm rigidly secured to the lower end of said bearing pin, and constrained thereby to swing in a plane parallel to the direction of said stylus lever.

In testimony whereof I have hereunto set my hand this 30 day of January 1913.

PETER WEBER.

Witnesses:

LOUIS M. SANDERS,  
LOUISE GREEN.







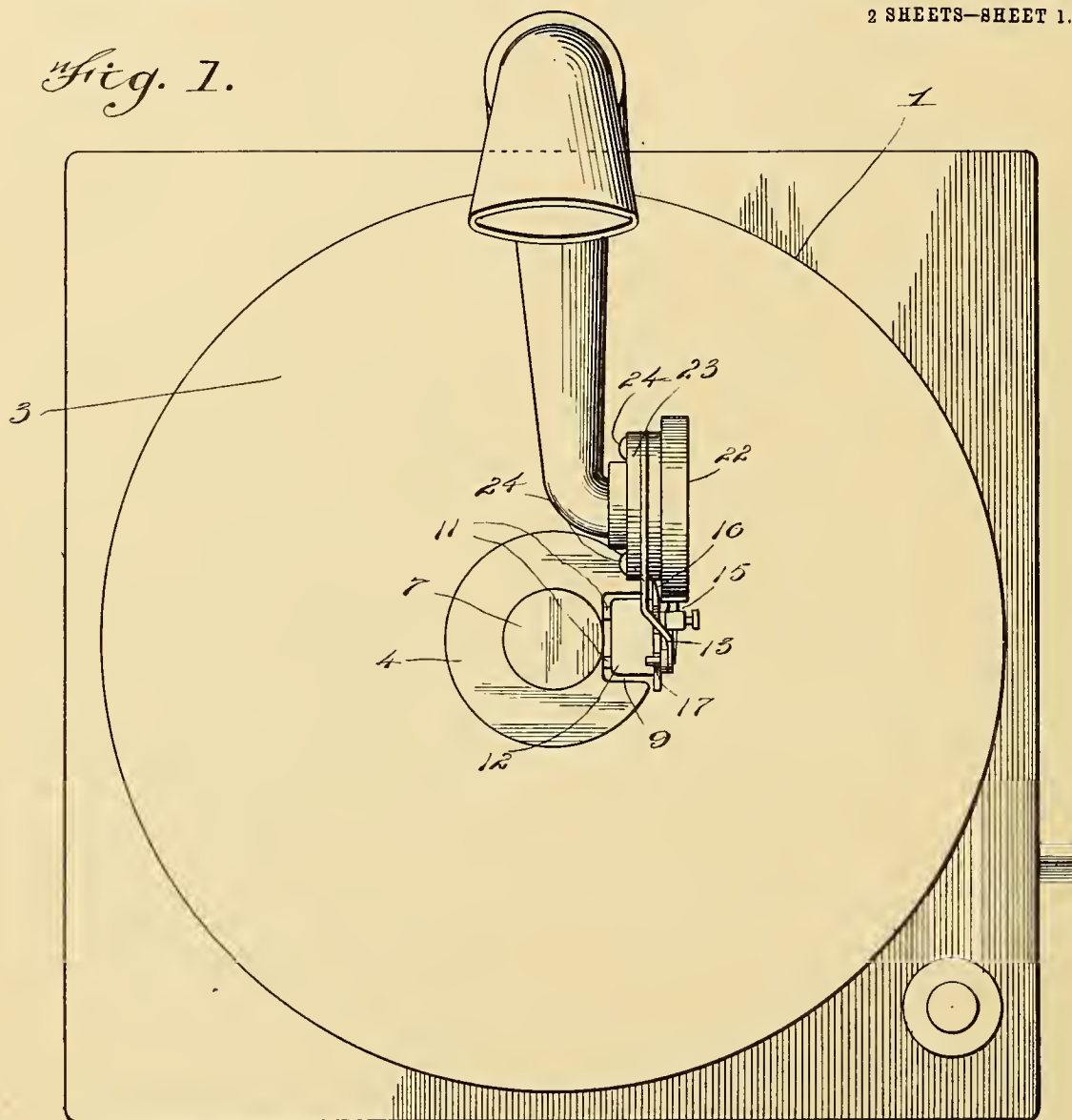
W. C. HOLLAND.  
TALKING MACHINE ATTACHMENT.  
APPLICATION FILED AUG. 28, 1912.

1,087,493.

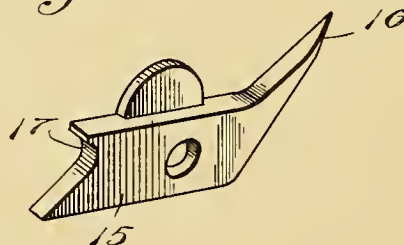
Patented Feb. 17, 1914.

2 SHEETS—SHEET 1.

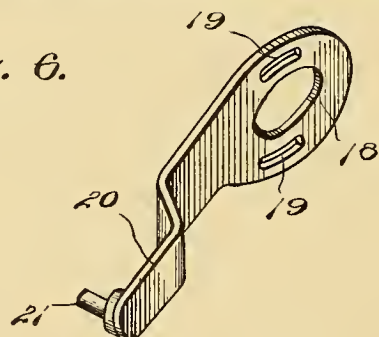
*Fig. 1.*



*Fig. 5.*



*Fig. 6.*



Inventor  
*William C. Holland.*

Witnesses

*C. E. Kimpes,*  
*E. Edwards*

By *Victor J. Evans*

Attorney



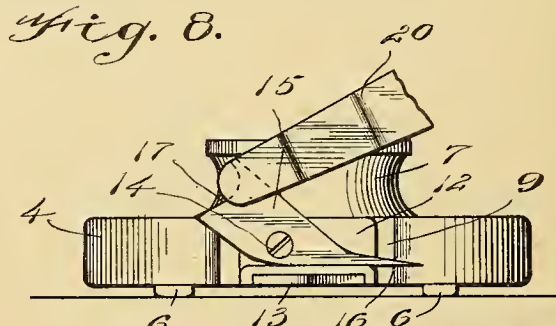
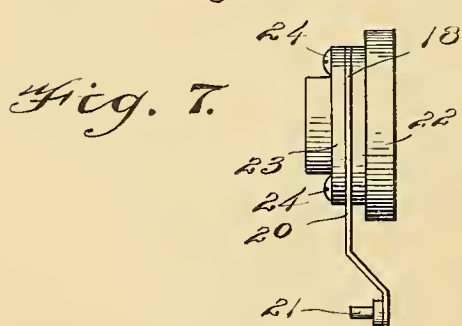
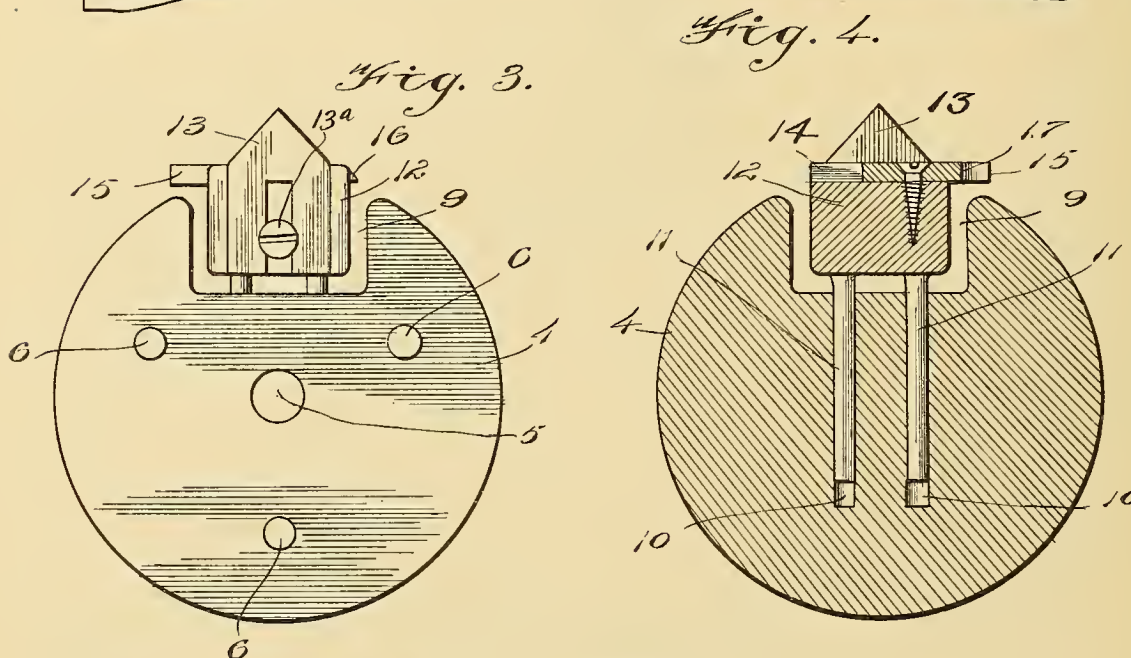
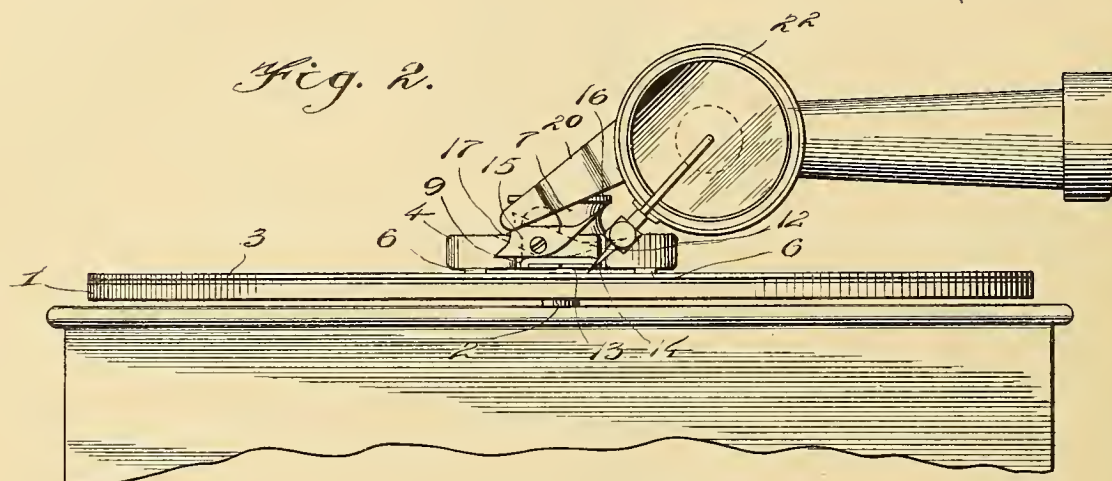


W. C. HOLLAND.  
TALKING MACHINE ATTACHMENT.  
APPLICATION FILED AUG. 28, 1912.

1,087,493.

Patented Feb. 17, 1914.

2 SHEETS—SHEET 2.



Inventor  
William C. Holland.

Witnesses

*C. E. Kumpfer.*  
*E. E. Woodruff.*

By *Victor J. Evans*  
Attorney

# UNITED STATES PATENT OFFICE.

WILLIAM C. HOLLAND, OF NIAGARA FALLS, NEW YORK.

## TALKING-MACHINE ATTACHMENT.

1,087,493.

Specification of Letters Patent.

Patented Feb. 17, 1914.

Application filed August 28, 1912. Serial No. 717,608.

*To all whom it may concern:*

Be it known that I, WILLIAM C. HOLLAND, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Talking-Machine Attachments, of which the following is a specification.

This invention relates to talking machine attachments and the principal object of the invention is to provide a simple and efficient device for automatically stopping the rotation of the record and for lifting the needle therefrom.

A further object of the invention is to provide a device of this character which may be adjusted for use on different sized records and for use on different types of machines so that the attachment may be sold for universal use.

Further objects of this invention will appear as the following specific description is read in connection with the accompanying drawing, which forms a part of this application, and in which:—

Figure 1 is a top plan view showing the attachment applied to an ordinary disk talking machine. Fig. 2 is a side elevation thereof. Fig. 3 is a bottom plan view of the attachment removed. Fig. 4 is a horizontal sectional view through the attachment. Fig. 5 is a perspective view of the tripping dog supporting head removed from the attachment. Fig. 6 is a perspective view of the reproducer lifting arm removed. Fig. 7 is a detailed edge elevation of said arm showing its association with the reproducer or sound box. Fig. 8 is a side elevation showing the position of the parts when operated.

Referring more particularly to the drawing, 1 represents the ordinary table of a disk talking machine which is mounted upon the driving shaft 2 thereof, said driving shaft projecting above the table, as is usual to center the record 3 thereon, as is customary.

The attachment comprises a circular weighted base 4 having a central socket 5 in its under side to receive the projecting end of the shaft 2. The bottom of the base 4 has suitable friction pads 6 arranged thereon so as to engage the face of the record and to cause the base to rotate with the record and to prevent scratching of the same. The base is provided with a vertical head 7 by which the same can be manipulated and is provided with a notch 9 in its side, as shown.

Extending inwardly from the inner wall of the notch are separated apertures 10 in which are slidable the supporting pins 11 carrying upon their outer ends the adjusting head 12. This adjusting head has a set screw passing into the same from the under side which holds the gage plate 13 in adjusted position. This gage plate is used to determine the distance between the needle of the sound box and the tripping arm, as will be hereinafter described.

The head 12 is provided with a horizontal shelf 14 and pivoted to the head above the shelf is a tripping dog 15 having a diagonally projecting finger 16 formed on one end and the opposite end provided with a notch 17.

The tripping arm comprises a circular centrally apertured head 18 having diametrically opposite arcuate slots 19 formed therein and a tangentially extending arm 20 having a laterally projecting pin 21 on its outer end. This arm is adjustably secured to the reproducer 22 by means of a plate 23 which has screws 24 passing therethrough and through the arcuate slots 19 and being threaded into the reproducer. By loosening the screws, it will be seen that the plate 18 may be turned on the reproducer and the vertical adjustment of the pin 21 readily obtained.

In the operation of the device, the gage plate 13 is properly adjusted laterally on the head 12 so as to determine the distance between the needle and the end of the pin 21 and held in such position by the set screw 13<sup>a</sup> which is threaded into the head 12. The base is then placed upon a record and the head 12 adjusted so as to bring the point of the gage plate 12 in alinement with the last inner groove on the record. The machine is then started in operation, as is usual, with the dog in the position shown in full lines in Fig. 2. When the needle is traveling in the last inward groove of the record, the pin will be brought into engagement with the finger 16 and the dog will be tilted to the position shown in dotted lines in Fig. 2. The disk and base will then make one more complete revolution when the pin will be in position to engage the notch 17 formed in the forward end of the dog. The dog in turning on its pivotal point will raise the pin 21 and thereby the tripping arm 20 and the sound box thus lifting the needle from the record and preventing the same from



scratching. The friction of the rubber pads  
6 upon the record and the friction of the  
record upon the table will be sufficient to  
stop the rotation of the machine until the  
5 operator can apply the brake.

What is claimed is:—

1. An attachment for disk talking ma-  
chines provided with a rotating disk, sound  
box and needle comprising a weighted  
10 mounting member removably carried upon  
the disk of the machine, a radially adjust-  
able head carried by the mounting member,  
an adjustable gage plate carried by the  
head, a tripping dog pivotally mounted  
15 upon the head for vertical movement, and  
an arm adjustably secured to the sound box  
of the machine and adapted to engage the  
tripping dog, said dog and arm coacting to  
raise the sound box when the needle thereof  
20 reaches a predetermined point in its travel  
over the disk.

2. An attachment for disk talking ma-  
chines provided with a rotating disk and

sound box comprising a weighted mounting  
member adapted to be removably carried 25  
upon the disk of the talking machine, a  
laterally adjustable head carried by the  
mounting member, an adjustable gage plate  
carried by the head, a tripping dog pivotally  
30 mounted upon the head for vertical move-  
ment and having a diagonally offset end and  
a notch in the opposite end, an arm adjust-  
ably secured to the sound box of the machine  
and a laterally extending pin on said arm  
35 adapted to engage the offset end on the dog  
to immediately operate the same, said pin  
adapted to engage in the notch and further  
operate the dog to the limit of its movement  
whereby the sound box will be raised and  
40 the rotation of the disk stopped.

In testimony whereof I affix my signature  
in presence of two witnesses.

WILLIAM C. HOLLAND.

Witnesses:

HERMAN T. HOLLAND,  
FRED. C. HOFFMAN.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

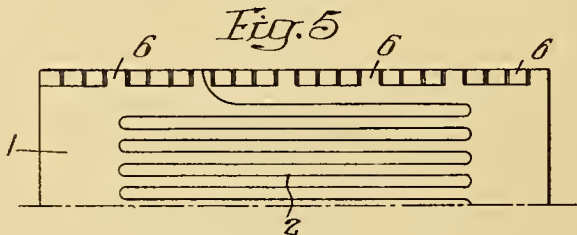
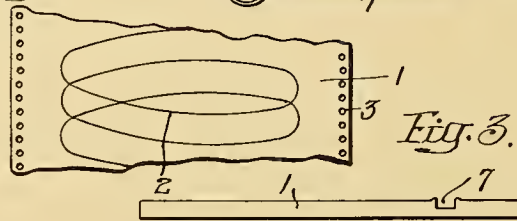
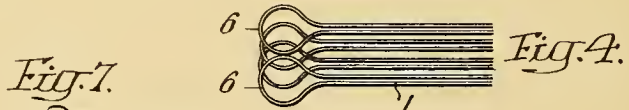
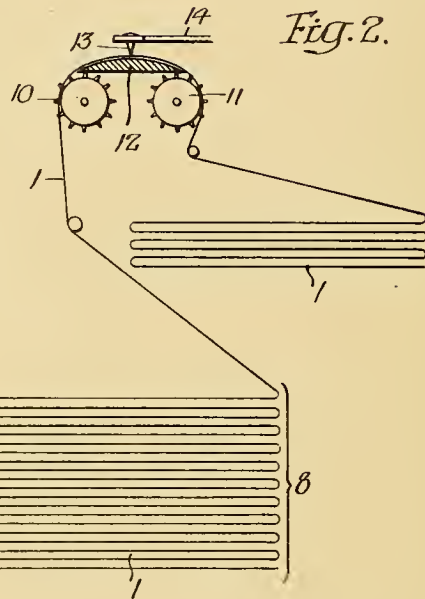
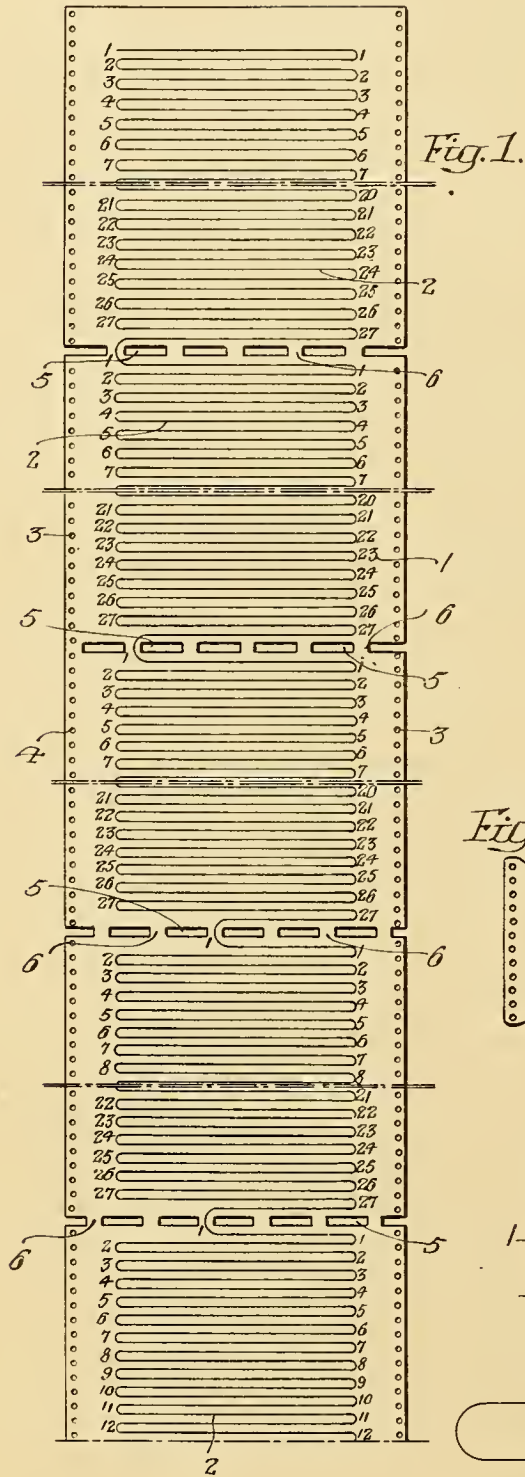
---



F. H. GREGORY.  
 PHONOGRAPH RECORD.  
 APPLICATION FILED SEPT. 10, 1910.

1,089,835.

Patented Mar. 10, 1914.



Witnesses—  
 Walter Chism  
 Wills A. Burrows

Inverton—  
 Friend H. Gregory.  
 by His Attorneys—  
 Howson & Howson



# UNITED STATES PATENT OFFICE.

FRIEND H. GREGORY, OF PHILADELPHIA, PENNSYLVANIA.

## PHONOGRAPH-RECORD.

1,089,835.

Specification of Letters Patent.

Patented Mar. 10, 1914.

Application filed September 10, 1910. Serial No. 581,391.

*To all whom it may concern:*

Be it known that I, FRIEND H. GREGORY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented  
5 certain Improvements in Phonograph-Records, of which the following is a specification.

One object of my invention is to provide a novel form of record and supporting  
10 structure therefor whereby in conjunction with suitable mechanism it shall be possible to obtain and reproduce a sound record of practically any length; it being further desired that the "record" made according to  
15 my invention shall have its parts so disposed as to occupy but relatively little space, even though it be of comparatively great length.

Another object of the invention is to provide a record for a talking machine of such  
20 a nature that notes indicating its subject matter may be conveniently applied to it without material loss of space and at any desired portion of its length; it being thus possible to provide a musical record with  
25 any desired directions for its rendition.

Another object of my invention is to provide a record supporting structure in the form of a ribbon or strip of any desired  
30 length, having a sound record in the form of a line of varying depth or of an undulatory nature, arranged or placed upon it in such manner as shall utilize to the best advantage the record receiving surface.

These objects and other advantageous ends  
35 I secure as hereinafter set forth, reference being had to the accompanying drawings, in which:—

Figure 1, is a plan of a portion of a phonograph record constructed according to my  
40 invention; Fig. 2, is a diagrammatic view illustrating one method of using the record; Fig. 3, is a fragmentary section on a greatly enlarged scale, showing one of the features of the invention; Fig. 4, is an enlarged  
45 side elevation showing the disposal of the ends of successive sections when my record strip is folded; Fig. 5, is a plan of the strip shown in Fig. 4; Fig. 6, is an enlarged plan showing another of the features of the invention, and Fig. 7, is a fragmentary plan  
50 of a modified form of sound record.

In the above drawings, 1 represents a strip of any desired length and of suitable  
55 width, made of some material capable of efficient use for the reception of phonograph records, such, for example, as some

gum-containing or shellac-like body which may be made in the desired form and possess sufficient flexibility to permit of its passage through a sound recording or reproducing machine, and of its being folded for  
60 storage, or wound on a reel. It is understood, however, that I do not limit myself to any particular material for my record, as a number of substances may be employed  
65 so that they satisfactorily perform the functions. Upon this ribbon or strip of material and by means of any suitable record-making machine operating in the well known manner, I form the sound record; this being  
70 preferably disposed on the strip in the form of a continuous line extending back and forth transversely thereof, as indicated at 2. It is understood that for the purpose of making this record the machine will necessarily  
75 have to include some device for periodically oscillating the arm carrying the record making needle point or other member, and it is obvious that at the same time it will be necessary to intermittently or  
80 continuously move the record receiving strip relatively to said needle. The movement of these two parts may be so proportioned that the record is formed in a series of substantially parallel lines whose extremities are  
85 joined to form an endless line, either by V or U-shaped portions or by such curved parts as may be found necessary. For satisfactorily moving the strip through the record-making or reproducing machine, I provide  
90 its edges with two series of perforations 3 and 4 in the manner common to films for moving picture machines.

In order that records made according to my invention may occupy a minimum of  
95 space and may be folded so as to fit in a container without injury to themselves, I cut a series of transverse notches in the strip so as to divide it into a number of sections joined to each other by tabs or bridges of  
100 greater or less length. These section-uniting portions are indicated at 6 and it is to be noted that the slots 5 are cut in the strip in sets so that the bridge pieces 6 of three successive sets, for example, are at different  
105 distances from the edges of the strip. As a result, when said strip is folded back and forth upon itself, as indicated in Figs. 2 and 4, the bends in said strip occur at the bridge pieces joining one section to the next. In  
110 forming a record upon the strip, the path of the record-making needle is made to pass

from one section of the strip to the next across one of the bridges 6 so that there is no interruption in the record made.

When the sections of the record strip are laid or folded parallel with each other, the bridges 6 are necessarily sharply bent and if such sections were tightly pressed together, said bridges 6 would either break in time or injure the record line crossing them. By, however, cutting the slots out of the record in the manner illustrated and above described, the bridges uniting two adjacent sections will enter or fit within a part of the slot formed between two other sections, with the result that they are not sharply curved or bent when the strips are piled together.

In order to assist in guiding the record-making or reproducing needle to where it reverses its direction of movement in forming the record adjacent the edges of the strip, I may, in some instances, confine it to a definite path, stamping or otherwise forming in the strip a channel or groove, as indicated at 7 in Fig. 3. This, however, is not necessary in every case, since I usually depend upon the mechanism of the record-making or reproducing machine to properly direct its needle.

Under conditions of use the continuous record strip may be drawn from any suitable container, in which it is folded in a series of parallel sections, as illustrated at 8, Fig. 2, and, by means of a machine including a pair of toothed wheels 10 and 11, driven from any suitable source of power, it may be passed over a guide piece 12, during which time its sound record line is engaged by a needle 13, carried by a lever or other suitable form of arm 14, belonging to a record-making or reproducing device. After so passing the machine, the record strip may be again folded, preferably automatically, and depos-

ited in a receptacle. It is, of course, understood that the arm 14 is driven synchronously with the wheels 10 and 11 by means of properly designed mechanism, which, however, forms no part of the present invention.

If desired, the sound record line of the record may be interlined for purposes of reference, and various notes may be made on the margin of the record strip, as, for example, each line may be numbered, as shown, and the sections may be independently numbered.

It is to be understood that in some cases I may make the record strip without the transverse slots or notches, and wind it on reels for storage or transportation, although I preferably employ said slots for the reasons noted.

As shown in Fig. 6, I may dispose the sound record line upon the record strip in the form of a continuous scroll 16, instead of as shown in the other figures, and it is to be understood that such a form of record is contemplated and included as part of my invention.

I claim:—

A record strip for a talking machine, consisting of a continuous length of flexible material provided with a number of series of transverse slots dividing it into sections, the slots between the adjacent sections being varied as to their positions to provide openings for the reception of the bridge pieces formed by the slots between other sections.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRIEND H. GREGORY.

Witnesses:

WM. BROWN, Jr.,

WILLIAM E. BRADLEY.

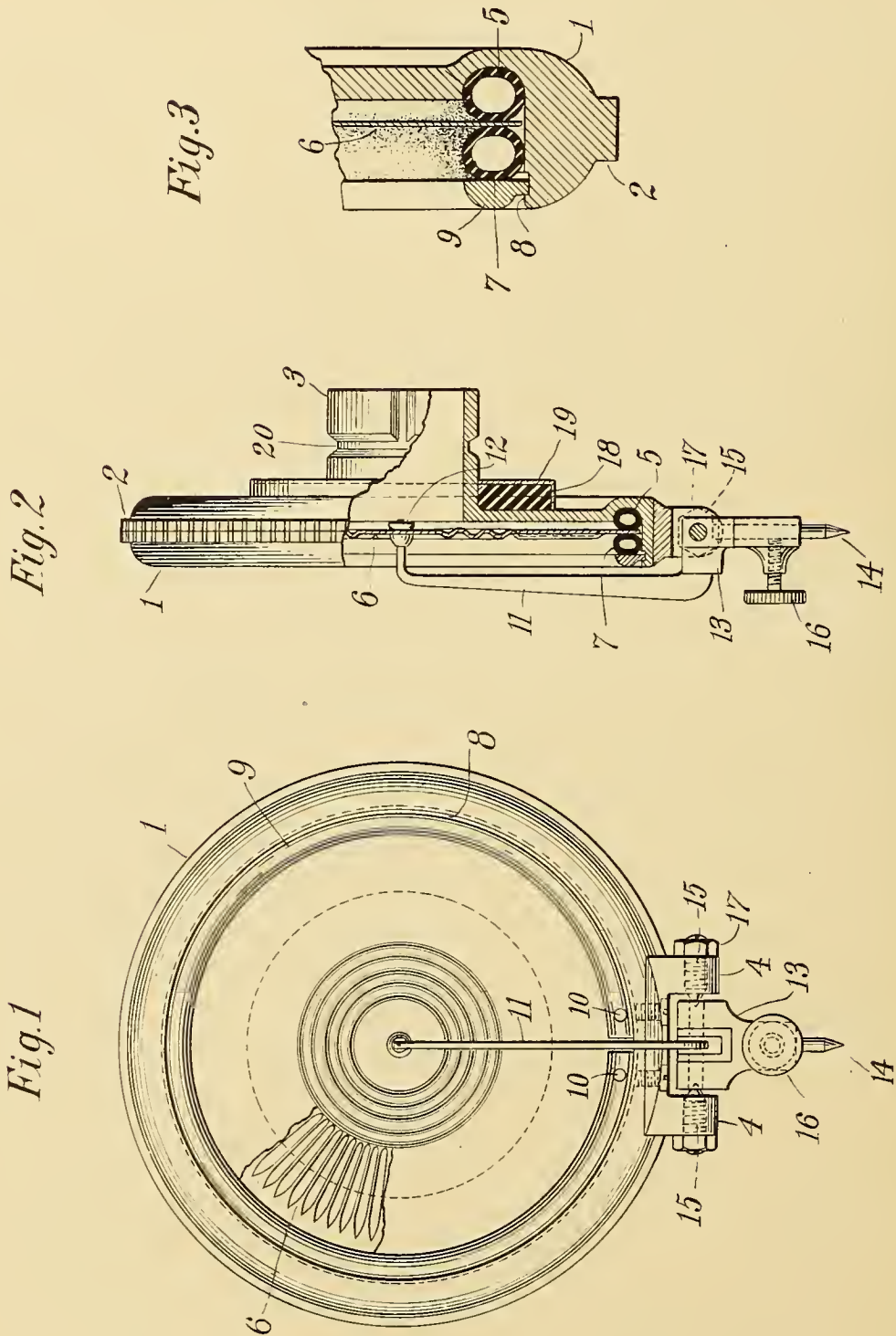




T. H. MACDONALD.  
SOUND BOX.  
APPLICATION FILED JULY 21, 1910.

1,091,001.

Patented Mar. 24, 1914.



Witnesses:  
H. A. Wood.  
Lillie E. Herms

Inventor  
Thomas H. Macdonald.  
By his Attorneys  
Mauro, Cameron & Massie

# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-BOX.

1,091,001.

Specification of Letters Patent.

Patented Mar. 24, 1914.

Application filed July 21, 1910. Serial No. 573,061.

*To all whom it may concern:*

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Sound-Box, which invention is fully set forth in the following specification.

My invention relates to sound-boxes for talking-machines, particularly those of the type operating upon "zigzag" sound-records.

The objects of the invention are to cheapen and simplify the construction of the sound-box, and to improve the quality of its audible reproduction.

The invention comprises the pivoting of the stylus-lever upon a positive axis, consisting preferably of cone-bearings, and the locating of the stylus and of said axis in the plane of the diaphragm.

The invention further comprises the secure yet readily detachable mounting of the diaphragm in such manner that it is unconfined against vibrating with the utmost freedom. And, finally, the invention consists in the various details of construction and arrangement hereinafter pointed out and claimed.

The invention will be best understood by reference to the annexed drawings that illustrate a preferred embodiment thereof.

Figure 1 is a front view or elevation of my improved sound-box; Fig. 2 is an edge view thereof, partly in section; and Fig. 3 is a detail, on an enlarged scale, showing the manner of securing the diaphragm in place.

The head or casing 1 consists of a shallow circular cup having the marginal rim 2, the hollow neck 3 that surrounds the central aperture in the head, and the two parallel lugs 4—4 that project from the rim 2. Preferably these parts are an integral casting, which may be of aluminum or other suitable material; and preferably the outer side of the back may be hollowed out as indicated in Fig. 3, for the sake of lightness. Inside the concavity of the head and around the periphery of its floor is an annular groove, semi-circular in cross-section, in which is placed a yielding gasket, preferably a small rubber tubing 5. Upon this is laid the diaphragm 6, preferably of aluminum, and preferably having concentric corrugations

in its central portion and radial corrugations outside of the former, as indicated in Fig. 1. The diameter of the diaphragm is slightly less than the diameter of the cup, so that its outer edge does not quite touch the inclosing wall 2 (Fig. 3). Above the diaphragm is placed a second yielding washer 7, opposite to washer 5 and corresponding to it. Above this and in wall 2, near its upper edge, is an annular recess providing an overhanging shoulder or lip 8, for receiving the locking-device. The locking device is shown as a split ring 9, and on either side of the split in said ring is a hole or seat 10. By inserting the tips of a pair of pliers into these holes 10—10 and compressing the pliers, the split ring may be closed; it is then placed upon the upper gasket ready to enter the recess last-mentioned, and by removing the pliers the ring 9 expands into said groove and engages beneath lip 8, thus locking the diaphragm securely but yieldingly in place. To remove the diaphragm, the holes 10—10 are forced together by the pliers, when the ring 9 is removed and the diaphragm taken out.

The stylus-lever 11 lies parallel to the diaphragm and extends radially thereof; its inner end is turned down and secured to the center of the diaphragm, as by a button or rivet 12 in the well known manner; while its outer end is similarly turned down to connect with its pivot-block 13, which is located between the lugs 4—4. The pivot-block is preferably made integral with lever 11, and carries the reproducing-stylus or needle 14, which latter extends in the prolongation of a radius of the diaphragm 6, and preferably lies in substantially the plane of the diaphragm. Pivot-block 13 is positively pivoted transversely of the prolonged radius last referred to. The preferred pivoting comprises cone-tipped screws 15—15, screw-threaded through lugs 4—4, to enter corresponding cone-seats in the adjacent faces of pivot-block 13. The axes of these two screws are of course in the same line, and preferably they lie in substantially the same plane as the diaphragm, extending at right angles to the prolonged radius last referred to. So that the positive pivot or axis of the pivot-block, the diaphragm itself, and the stylus 14, all lie in substantially the same plane. By reason of this construction and arrange-



ment the vibrations of the needle are transmitted directly and truly, and in most sensitive fashion, to the diaphragm. The needle is shown as inserted into a socket in the end of pivot-block 13, where it is held by a set-screw 16; but any other mounting for the needle may be employed. Care should be taken in properly and accurately centering the cone-bearings; and preferably one or more jam nuts 17 will be employed at the outer ends of screws 15, to hold the latter against turning, to insure a permanent adjustment.

Preferably a ring or washer 18, of yielding material, as soft rubber, encircles neck 3 and rests against the back of the sound-box, being covered by a flanged plate 19, which may be cemented thereto, the down-turned flange not contacting with head 1. The neck 3 is shown as provided with a bayonet-joint groove 20, for securing it to the tone-arm or other sound-conveyer. The function of the yielding block 18 is to prevent rattle of the sound-box against the arm, but flange-plate 19 and even the yielding washer 18 may be omitted if desired.

The striking features of my novel sound-box are its lightness and simplicity, the fewness of its parts, the ease of manufacturing and assembling the parts, readiness of disassemblage for repairs, etc., and the brilliant excellence of the audible reproductions obtained by its use.

I have described my invention with some particularity of detail, but only for the sake of clearness, since parts may be used to the exclusion of other parts, and modifications may be resorted to in the construction or in the arrangement of the various parts, without departing from the spirit of my inven-

tion, which broadly stated consists in locating the stylus or needle and the positive axis of its lever in substantially the same plane with the diaphragm, and in securely yet detachably mounting the diaphragm yieldingly within the head of the sound-box.

Having thus described my invention, I claim:

A sound-box comprising an integral cup with a central opening and having around the periphery of the floor of its concavity an annular groove and near the top of the cup an annular recess, two lugs projecting outwardly from the walls of said cup, two yielding gaskets in said concavity, one of which is located in said groove, a diaphragm interposed between said gaskets, a split ring having an outwardly projecting peripheral flange, which ring rests upon said second gasket with its flange in said recess to hold said gaskets and said diaphragm in place, said flange being of less thickness than the width of said recess to provide a clearance to permit of the ready removal of said ring, a reproducing needle lying in the plane of said diaphragm and extending radially therefrom, a stylus-lever connecting said diaphragm and said needle, said lever being provided with a pivot lying in the plane of the needle and the diaphragm and having bearing in said lugs, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

GLENDORA FLINT,  
JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

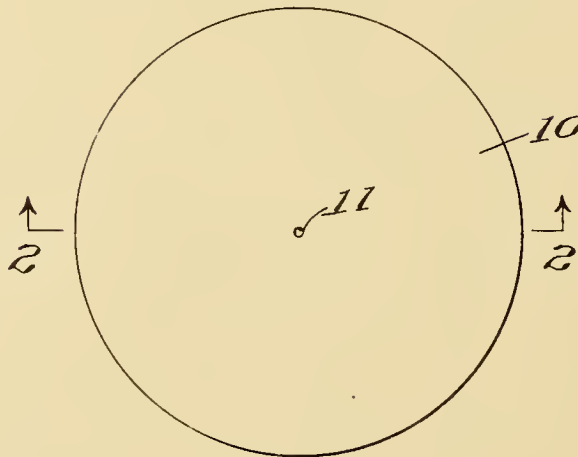




1,091,202.

Patented Mar. 24, 1914

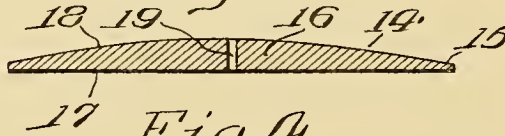
*Fig. 1.*



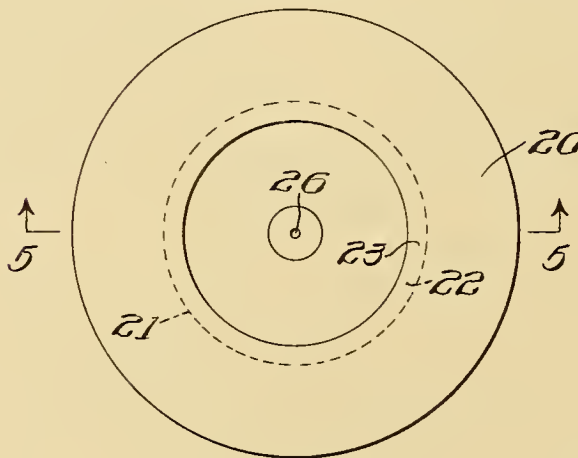
*Fig. 2.*



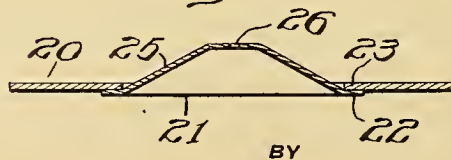
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



WITNESSES

*F. J. Hartman.*  
*Clifton C. Hallowell*

BY

INVENTOR

*John C. English.*

*Wm. C. English.*

ATTORNEY

# UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-BOX DIAPHRAGM.

1,091,202.

Specification of Letters Patent.

Patented Mar. 24, 1914.

Application filed February 2, 1912. Serial No. 675,019.

*To all whom it may concern:*

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Box Diaphragms, of which the following is a specification, reference being had to the accompanying drawing.

10 This invention particularly relates to vibratory diaphragms for sound reproducing devices such as are coöperatively employed in connection with sound reproducing mechanism of a talking machine.

15 It is believed that diaphragms, which in themselves are more or less resonant, and emit individual tones peculiar to their material or structure, produce vibrations which are sympathetic with, and to a considerable extent tend to interfere with tones produced by vibrations effected by sound waves of similar frequency, which it is desired to record, and which tend to cause disturbances which produce unpleasant and disagreeable  
20 sensations upon the ear of the hearer in the reproduction of a record.

The principal object of this invention is to provide a diaphragm which tends to obviate the difficulties experienced in diaphragms having an individual resonance by forming the diaphragm of substantially non-resonant material, preferably composed of a subereous formation.

Other objects of this invention are to provide a diaphragm of such extreme lightness and flexibility as to be capable of responding to, and reproducing the most minute and delicate sound waves, with all their overtones, and consequently to produce  
40 substantially the full volume of the original sounds; to provide a diaphragm of such uniformity as to produce substantially perfect recitation or reproduction of the original sounds; to provide a diaphragm formed of such resilient material as to be capable of being supported without employing gaskets, and prevented from rattling by rigidly engaging its peripheral edge between the opposed faces of the relatively adjustable  
50 members of the sound box; and to provide a diaphragm which will adhere to the faces of the sound box members.

Further objects of this invention are to provide a diaphragm which is formed of a material readily obtainable; and to provide

a diaphragm which is simple in construction, efficient in operation and which may be cheaply produced in any desired quantity.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawing, Figure 1 is a face view of a diaphragm conveniently formed in accordance with this invention: Fig. 2 is a central transverse sectional view of said diaphragm, taken on the line 2—2 in Fig. 1; Fig. 3 is a view similar to Fig. 2 showing a possible modification of the diaphragm shown in Figs. 1 and 2; Fig. 4 is another form of diaphragm constructed in accordance with this invention, and Fig. 5 is a central transverse sectional view of the diaphragm shown in Fig. 4 taken on the line 5—5 in said figure.

In said figures, the diaphragm shown in Figs. 1 and 2 comprises a substantially flat thin disk 10, formed of compressed comminuted subereous material, which is provided with a central aperture 11 for the convenient attachment of the free end of a stylus bar, or similar member of any suitable sound reproducing device.

The form of this invention illustrated in Fig. 3 comprises a diaphragm 14 formed of comminuted subereous material, coalesced by compression, and having a substantially thin peripheral edge 15 and a relatively thick central portion 16, preferably formed with a plane surface 17, and a convex surface 18, and being provided with the usual aperture 19 for engagement of a stylus bar or equivalent member.

Although the form of this invention shown in Fig. 3 has its opposite surfaces respectively plane and convex, it is to be understood that this invention is intended to include a diaphragm having opposite convex surfaces to form a thin peripheral edge and a relatively thick central portion.

In the form of this invention shown in Figs. 4 and 5, the diaphragm comprises a substantially flat highly flexible annulus 20 preferably formed of comminuted subereous material, coalesced by compression, and a relatively inflexible central web 21, joined along its peripheral margin 22, with the inner margin 23 of the annulus 20 in any suitable manner, preferably by an adhesive.

While the central web 21 of the diaphragm



shown in Figs. 4 and 5 comprises a web of substantially rigid material, such for instance as stiff paper, and preferably in order to increase its rigidity without substantially increasing its weight has a bulged central portion 25, as best shown in Fig. 5, it may be otherwise formed to produce substantially similar results. The central bulged portion 25 of said diaphragm is provided with the central aperture 26 for the convenient connection of the vibratory member of a suitable sound reproducing device.

The comminuted subereous material may be held together by any suitable binder, such for instance as nitro-cellulose, which permits such flexibility of material when compressed as to permit a diaphragm formed thereof to respond to the most delicate and minute sound waves, and such diaphragm has been found to produce most desirable results, which it is assumed is due to its being formed of a material which appears to have little or no individual resonance within the range of ordinary audible sounds. Furthermore, diaphragms constructed in accordance with this invention have been found to reproduce sounds uniformly, that is to say, in reproducing from the same record different diaphragms reproduce said record with the same clearness and volume, and the reproduction has been found to be uniform in all respects, which is believed to be due to the fact that such diaphragms formed in accordance with this invention are of uniform texture and consequently are free from local stresses.

While it is believed that the best results have been attained by the use of a diaphragm formed of a subereous composition, such as comminuted cork, natural cork may be employed with substantially good results, and therefore it is to be understood that this

invention is not to be confined to the specific subereous material hereinbefore referred to, but that any subereous material may be employed, and by the term "subereous" I mean any similar or equivalent materials to those above referred to, such for instance as comminuted wood or other fibrous material having subereous properties, and furthermore, the comminuted particles may be coalesced without a binder by compression alone.

It will be observed that sound boxes when provided with a diaphragm formed in the manner above described, which may be supported in a sound box or other suitable device without the employment of gaskets, may be assembled at a cost much less than when provided with diaphragms which require several parts to be fitted.

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made in form, structure and composition without departing from the essential features of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A diaphragm comprising an annulus of thin, highly flexible subereous material, and a bulged central portion formed of paper having its periphery secured to the inner margin of said annulus.

2. A diaphragm comprising an annulus of thin highly flexible subereous material, and a bulged central portion formed of paper having its periphery secured to the inner margin of said annulus by an adhesive.

JOHN C. ENGLISH.

Witnesses:

MARY E. ENGLISH,  
JOHN D. MYERS.

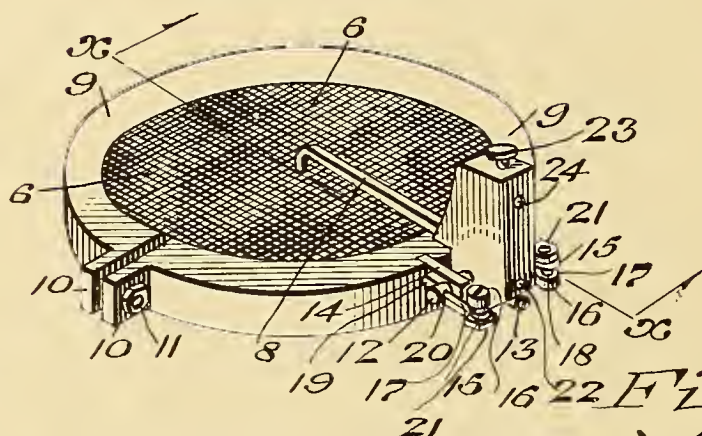


W. W. ZACKEY.  
SOUND BOX.  
APPLICATION FILED JULY 25, 1913.

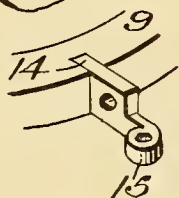
1,092,552.

Patented Apr. 7, 1914.

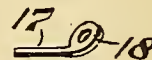
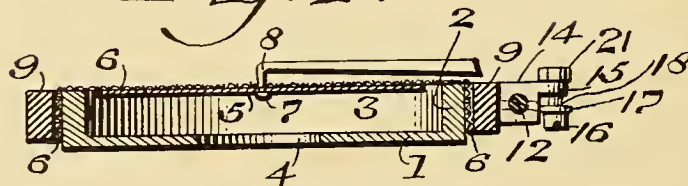
*Fig. 1.*



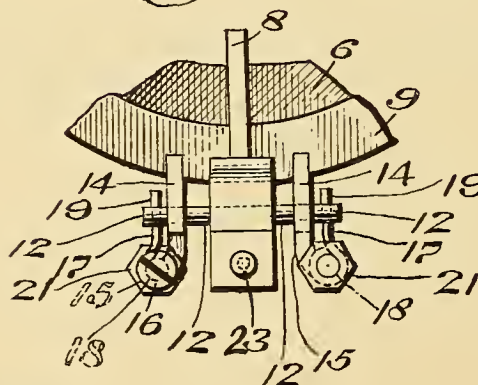
*Fig. 6.*



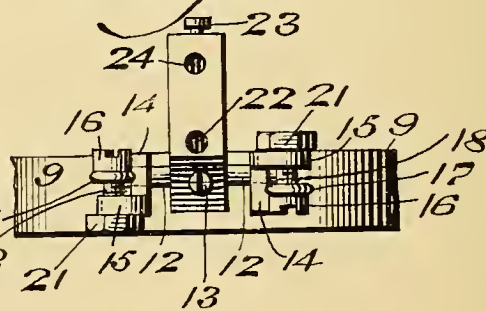
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



WITNESSES

*P. F. Nagle.*  
*H. E. Dieterich*

BY

*William W. Zackey.*  
*Wiedersheim & Fairbanks.*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

WILLIAM W. ZACKEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO CHARLES B. HEWITT, OF BURLINGTON, NEW JERSEY.

## SOUND-BOX.

1,092,552.

Specification of Letters Patent.

Patented Apr. 7, 1914.

Application filed July 25, 1913. Serial No. 781,055.

*To all whom it may concern:*

Be it known that I, WILLIAM W. ZACKEY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box, of which the following is a specification.

This invention relates to sound boxes for sound recording and reproducing machines, and has for an object to provide a diaphragm and mounting therefor, whereby not only is the sound reproduced in a desirable volume, but it is also perfect in quality and tone being free from metallic, grinding or scratching sounds.

It has for a further object to provide a sound box in which a portion of the diaphragm substantially floats within the box, and operates in conjunction with a flexible member formed of a suitable fabric whereby a sensitive and delicate means of transmitting sound waves is provided.

It has for a further object to provide a novel mounting for the stylus bar which operates in conjunction with the novel diaphragm construction to produce a balanced condition which materially increases the effective action of the diaphragm in the reproduction of sounds.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a perspective of a sound box embodying my invention. Fig. 2 represents a section on line  $x-x$  of Fig. 1. Fig. 3 represents a plan of a portion of the sound box showing details of the stylus bar mounting. Fig. 4 represents a side elevation of the part shown in Fig. 3. Fig. 5 represents a perspective of one of the dia-

phragm springs. Fig. 6 represents a perspective of one of the stylus bar supporting ears.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: The sound box embodying the principles of my novel invention consists, in the present instance, of a body member 1, having an annular circumferential flange 2 thereon forming a compartment 3 from which the sound waves are discharged through the opening 4, preferably disposed at substantially the center of the body 1. The compartment 3 is adapted to receive a disk 5 of mica or like material which serves with other adjuncts the purpose of a diaphragm for the otherwise open end of the body 1, and it will be noted that the said disk is located within and encircled by the flange 2.

6 designates a fabric preferably of silk or material of like texture, which is stretched across the flange 2 and completely closes the compartment 3. This fabric 6, in the present instance, is stretched with drum-like tightness as shown in Fig. 2, while the disk 5 is held in close contact with the said fabric by means of the fastening device 7, which is preferably a screw threaded into the outer bent end of the stylus bar 8. Thus the fabric member 6 and the disk 5 form together a flexible sensitive diaphragm capable of transmitting and reproducing sound waves.

9 designates a split ring adapted to encircle the flange 2, and securely clamp the edges of the fabric 6 against the outer walls of the flange 2. The ring 9 is provided with ears 10, and a suitable clamping bolt 11, in order to draw the ring 9 into close contact and maintain the parts in their adjusted positions.

The stylus bar 8 is fixedly secured to a spindle 12, by means of a set screw 13, and is of course suitably adjusted to normally maintain the disk 5 and the fabric 6 in neutral position. The spindle 12, as here shown, is pivotally mounted at each end in an outwardly projecting ear 14, suitably fixed to the ring 9 and terminating in an apertured lug 15, adapted to receive a bolt 16 or like



fastening device. It will be noted that the ears 14 are disposed in opposite relation to each other, so that one of the lugs 15 is adjacent one side of the ring 9, while the other lug is adjacent the opposite side.

17 designates a pair of springs preferably formed of spring wire and each having an eye 18 arranged in offset relation to the body portion of the spring for a purpose which will now be described. The springs 17 are respectively carried by the fastening devices 16, and the end 19 of each passes through an opening 20 in the spindle 12, so that the action is to return the stylus bar 8 to its normal or neutral position, after a movement of the diaphragm members. Attention is directed to the fact that one of the springs 17 has its offset portion turned in one direction, while the other spring has the offset portion turned in the opposite direction, and the tension of the springs may of course be regulated by the nuts 21 of the fastening bolts 16. Thus movement of the diaphragm members in one direction is counteracted by the action of one of the springs, and movement thereof in the opposite direction is counteracted by the other spring, the tendency thereby being to balance the action of the diaphragm and make it possible to transmit a succession of sound vibrations each of which is clear, complete, and a faithful reproduction of a particular sound wave.

22 designates an opening in the stylus bar to receive the reproducing needle, and 23 designates the thumb screw for maintaining the needle in proper position. It will also be noted that a second needle opening 24 controlled by the same thumb screw is provided for a second needle, which is located in a different relation to the fulcrum of the stylus bar, and may be used in connection with records provided with the hill and dale grooves, while the needle used in connection with the opening 22, is for use in connection with the laterally undulating groove. In either case the sound wave is accurately transmitted to the diaphragm, and is reproduced distinctly.

It will be noted that the disk 5 is in close contact at all points with the stretched fabric 6, and is maintained entirely out of contact with the metal of the box, thereby being free to vibrate throughout its entire surface and providing a reproducing means which is extremely delicate and sensitive, one which eliminates entirely any metallic sounds or scratching noises usually accompanying the reproduction of sound where the diaphragm is fixed at its edges by portions of the sound box itself.

It will now be apparent that I have devised a complete unitary structure, simple in

construction, effective in operation and of such a sensitive nature as to reproduce a sound the tone quality of which cannot be distinguished from the original sound.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sound recording and reproducing machine, a sound box, a diaphragm operatively mounted therein, an arbor suitably mounted in a bearing in constant relation with respect to said sound box and adapted for rotary movement, a stylus bar fixedly carried by said arbor, and connected with said diaphragm, and independent springs suitably mounted and each acting torsionally and axially upon the said arbor, on portions thereof on the opposite sides of said bearing, in opposed relation, and tending to rotate said arbor in opposite directions.

2. In a sound recording and reproducing machine, a sound box, a diaphragm operatively mounted therein, an arbor suitably mounted in a bearing in constant relation with respect to said sound box and adapted for rotary movement, a stylus bar fixedly carried by said arbor and connected with said diaphragm, independent springs suitably mounted and each acting torsionally and axially upon the said arbor on the opposite sides of the bearing thereof in opposed relation and tending to rotate said arbor in opposite directions, and means for independent adjustment of said springs for balancing the tension thereof on said arbor.

3. In a device of the character stated, a body member having a centrally disposed opening therein, a diaphragm operatively connected to said body member, a stylus bar connected to said diaphragm, a spindle secured to said stylus bar and having an opening adjacent each end, a bearing for said spindle, a spring seated in each opening, an eyelet on one end of each spring, off-set therefrom and oppositely disposed with respect to each other, and adjusting means oppositely situated and passing through said eyelets for varying the tension of said springs.

4. In a sound recording and reproducing machine, a sound box, a diaphragm operatively mounted therein, an arbor, a support in which said arbor is mounted and adapted for rotary movement, a stylus bar fixedly carried by said arbor and connected with said diaphragm, and means, acting torsionally directly upon said arbor in opposed relation and tending to rotate said arbor in opposite directions to adjust the axial position thereof and acting to maintain the same frictional engagement of said arbor with said support at all times.

5. In a sound recording and reproducing

machine, a sound box, a diaphragm oper-  
atively mounted therein, an arbor suitably  
supported and fixedly carrying a stylus bar  
connected with said diaphragm, and means  
5 acting torsionally and axially upon said ar-  
bor in opposed relation and tending to rotate  
said arbor in opposite directions to adjust

the axial position thereof, and acting to  
maintain the same frictional engagement of  
said arbor with its support at all times.

WILLIAM W. ZACKEY.

Witnesses:

C. D. McVAY,

H. M. LAFFERTY.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

---



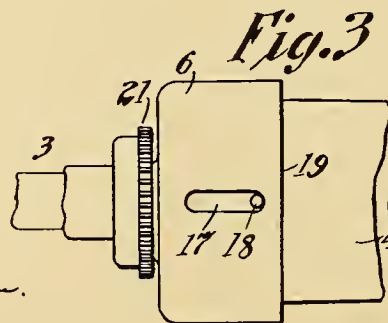
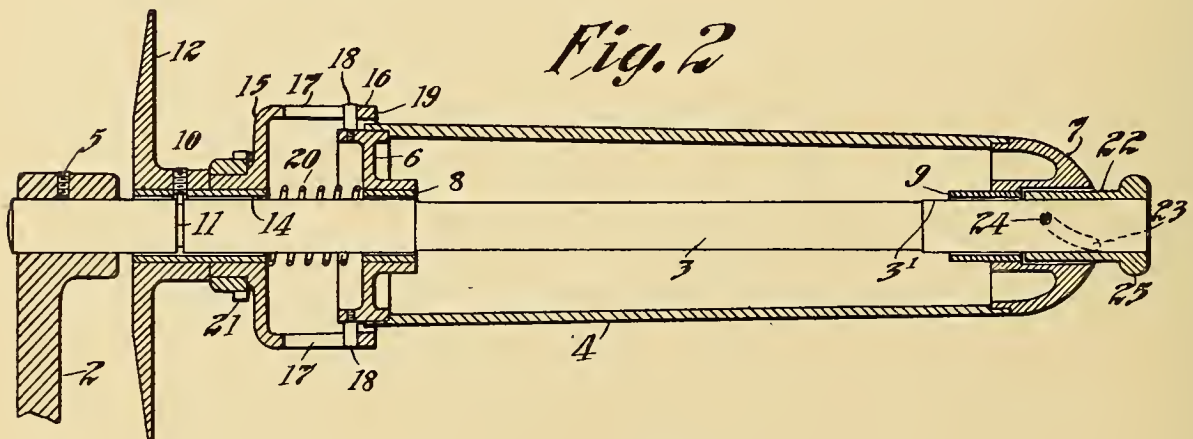
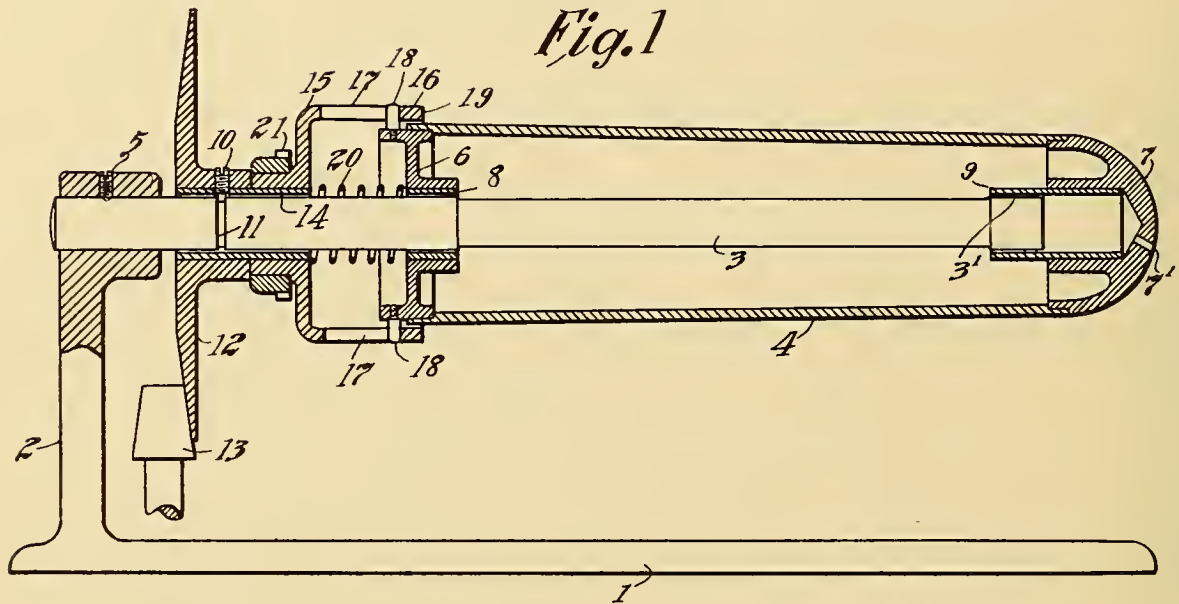




N. H. HOLLAND.  
 PHONOGRAPH.  
 APPLICATION FILED MAR. 13, 1911.

1,092,911.

Patented Apr. 14, 1914.



*Witnesses:*  
*W. H. Dresser*  
*Frederick Packmann.*

*Inventor:*  
*Newton H. Holland,*  
*By Frank L. Allen*  
*His Atty.*



# UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,092,911.

Specification of Letters Patent.

Patented Apr. 14, 1914.

Application filed March 13, 1911. Serial No. 614,278.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to phonographs and more particularly to new and improved means whereby the record of a phonograph may be readily disengaged from its support without damage to the record surface.

As ordinary phonograph records change in diameter to a considerable extent under different temperature conditions, expanding under heat and contracting under cold, and as the supports upon which the records are mounted change but little in diameter under the same conditions and are so constructed that when the records are slipped thereon, a tight engagement will be maintained between the same and the records, it frequently happens that the latter become so tightly locked to their supports that it is practically impossible to remove them by hand without damage to them.

It is the principal object of my invention to overcome this difficulty by providing improved means for automatically loosening the record from its support so as to permit it to be readily removed by hand. In conformity with this object, I preferably provide a movable record support and means mounted in proximity thereto for shifting the record relatively to the said support when the mandrel is moved from its normal position.

Other objects of my invention consist in the construction of parts and combinations of elements as will be more particularly pointed out in the claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawing forming a part of this specification, and in which:

Figure 1 represents a vertical longitudinal section through the center of the mandrel of a phonograph embodying my invention; Fig. 2 represents a similar view of a modification; and Fig. 3 represents a plan view of the left hand end of the mandrel.

In all of the views, corresponding parts

are designated by the same reference numerals.

Referring to Fig. 1, 1 represents a bed plate provided with a standard 2 in which the shaft or bearing 3 of the mandrel or record support 4 is fixedly secured by a set screw or other securing means 5. The mandrel 4 is mounted to rotate and to slide axially on the shaft or bearing 3 and is provided at its ends with members 6 and 7, which are in turn provided with bushings 8 and 9 respectively engaging the periphery of the shaft 3. The free end of the latter is preferably offset or enlarged as shown at 3', and the bushing 9 is made to extend to the left of the member 7 a short distance so as to permit a considerable relative axial movement between the mandrel and its bearing without disengaging the bushing 9 from the shaft 3. 7' is an air passage adapted to permit the passage of air into and out of the cylinder formed by the member 7 and the bushing 9 during the reciprocation therein of the offset end 3' of the shaft. Rotatably mounted on the shaft 3 but held from axial movement thereon by a set screw 10 coöperating with a circumferential groove 11 in the said shaft is a friction disk 12 driven from any suitable motor (not shown) by a friction member 13. The disk 12 is provided with a bushing 14 engaging the periphery of the shaft 3. As shown in the drawing, this bushing is held against movement relatively to the member 12 by the set screw 10, but obviously it could be secured to the said member by friction or in any other suitable way. The rotation of the disk 12 is transmitted to the mandrel 4 by a member 15 secured to the bushing 14, the said member being provided with an annular flange 16 having one or more longitudinal slots 17 therein. Pins or projections 18 preferably secured to the member 6 coöperate with said slots and are adapted to slide therein when the mandrel is shifted along the shaft or bearing 3. The pins 17 and slots 18 thus serve as means for transmitting the rotation of the driving means to the mandrel and at the same time as a guide for the mandrel during the axial movement thereof. The outer edge 19 of the flange 16 extends over and in close proximity to the



record bearing surface of the mandrel; so that as the mandrel is moved to the left, the left hand edge of the record is engaged by the said flange and is disengaged from the  
 5 mandrel. A compression spring 20, preferably a coil spring surrounding the shaft 3, bears against the opposing faces of the members 6 and 15, so as to cause the mandrel to automatically return to its normal position after it has been displaced therefrom.  
 10 This spring is preferably designed to be under a slight compression when the pins 18 are in engagement with the right hand end of the slots 17 and are thus held in place by  
 15 and rotate with the members 6 and 15. The numeral 21 represents a gear secured to the driving means and adapted to be connected with suitable means (not shown) for feeding the reproducer (not shown) along the  
 20 record.

In operating my improved device, the mandrel is given a quick thrust to the left, whereby the record is disengaged from and shifted longitudinally of the mandrel by  
 25 the abutment or flange 16, so that it may then be readily removed by hand, the spring 20 returning the mandrel to its normal position. With the modification shown in Fig. 1, the movement of the mandrel to the left  
 30 is produced by direct application of force to the right hand end of the mandrel, preferably by hand.

Fig. 2 shows my improved device provided with means to impart an axial thrust  
 35 to the mandrel. This means comprises a hollow tubular member 22 mounted on the outer end of the shaft 3, which latter extends through the member 7 and preferably slightly beyond the same. The member 22  
 40 is provided with an inclined slot 23 in which is slidably engaged the pin or projection 24 secured to the shaft 3; and the left hand edge of the said member 22 engages the opposing end of the mandrel, so that as the  
 45 said member is rotated by the knurled head 25, it is shifted longitudinally of the shaft or bearing 3 and carries the mandrel with it.

While I have shown certain preferred embodiments of my invention, I do not wish  
 50 to be limited to those disclosed; as my invention may evidently be carried out in numerous other ways. Any desired member adapted to loosen the record from its support upon the displacement of the latter may  
 55 be substituted for the abutments shown; and, in short, my invention is limited only as defined by the terms of the appended claims.

Having now described my invention, what  
 60 I claim as new and desire to secure by Letters Patent of the United States, is as follows:—

1. In a phonograph, a shaft, means supporting the same, a record support mounted  
 65 on said shaft and movable axially thereof,

and means mounted on said shaft in proximity to said record support and adapted to shift a record mounted on said support relatively to the latter when said support is moved axially of said shaft, substantially as described. 70

2. In a phonograph, a rotatable record support, a bearing therefor, and means for rotating said record support, said support being movable with respect to said means and said means being adapted to shift the record relatively to the said support when the latter and said means are moved relatively to each other, substantially as described. 75

3. In a phonograph, the combination of a rotatable record support, a bearing therefor, a member rotatable with said record support, said record support being movable relatively to said member, and said member being provided with an abutment adapted to shift the record relatively to the record support when the latter is moved in a given direction relatively to said member, and means for returning said record support to its normal position relatively to said member, substantially as described. 80

4. In a phonograph, the combination of a rotatable record support, a bearing therefor, a member rotatable with said record support, said support being axially movable relatively to said member, and said member being provided with an abutment adapted to shift the record relatively to the record support when the latter is moved in a given direction relatively to said member, and means for returning said record support to its normal position relatively to said member, substantially as described. 85

5. In a phonograph, the combination of a rotatable record support, a bearing therefor, a driving member for said record support, said driving member and record support being movable relatively to each other, and said driving member being provided with an abutment adapted to shift the record relatively to the record support when the latter and said driving member are moved toward each other, and yielding means for returning said driving member and said record support to their normal relative positions, substantially as described. 90

6. In a phonograph, the combination of a record support, a shaft extending axially thereof, means coacting with said shaft and support to move the same relatively to each other, and means for shifting a record mounted on said support relatively to the latter when said shaft and support are moved relatively to each other, substantially as described. 95

7. In a phonograph, the combination of a record support, a bearing therefor, an abutment mounted in proximity to the record supporting surface of said record support, 100

and means for moving said support and abutment relatively to each other to shift the record relatively to the record support, said means comprising a rotatable member engaging said support and having an inclined pin and slot connection with said bearing, substantially as described.

8. In a phonograph, the combination of a rotatable record support, a shaft along which said support is axially movable, and means mounted on said shaft in proximity to said support adapted to shift the record relatively to said support when the latter is moved axially, substantially as described.

9. In a phonograph, the combination of a rotatable record support, a bearing therefor, and a member rotatable with said record support, said record support being movable relatively to said member, and said member being provided with an abutment adapted to shift the record relatively to the record support when the latter is moved in a given direction relatively to said member, substantially as described.

10. In a phonograph, the combination of a movable record support, means for supporting the same, means mounted in proximity to the record support and adapted to shift the record relatively to said support when the latter is moved from its normal position, and means for automatically moving said support back to its normal position directly upon the cessation of the force moving the same from said position, substantially as described.

11. In a phonograph, the combination of a rotatable axially movable record support, means for supporting the same, means mounted in proximity to the record support and adapted to shift the record relatively to said support when the latter is moved axially from its normal position, and means for automatically moving said support back to its normal position directly upon the cessation of the force moving the same from said position, substantially as described.

12. In a phonograph, the combination of a rotatable axially movable record support, means for supporting the same, means mounted in proximity to the record support and adapted to shift the record relatively to

said support when the latter is moved axially from its normal position, and resilient means for automatically moving said support back to its normal position directly upon the cessation of the force moving the same from said position, substantially as described.

13. In a phonograph, the combination of a rotatable record support, a bearing therefor, and a driving member for said record support, said driving member and record support being movable relatively to each other, and said driving member being provided with an abutment adapted to shift a record mounted on said support relatively to the latter when said support and said driving member are moved in a given direction relatively to each other, substantially as described.

14. In a phonograph, the combination of a record support, a shaft extending longitudinally thereof, means coacting with said shaft and support to move said support relatively to said shaft, and means for shifting a record mounted on said support relatively to the latter when said support is moved in a given direction relatively to said shaft, substantially as described.

15. In a phonograph, the combination of a shaft, a record support mounted thereon, means coacting with said shaft and support to move the same relatively to each other, and means for shifting a record mounted on said support relatively to the latter when said shaft and support are moved relatively to each other, substantially as described.

16. The combination of a record support, a shaft extending longitudinally thereof, means coacting with said shaft and support and rotatable to move the same relatively to each other, and means for shifting a record mounted on said support relatively to the latter when said shaft and support are moved relatively to each other, substantially as described.

This specification signed and witnessed this 9th day of March 1911.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.



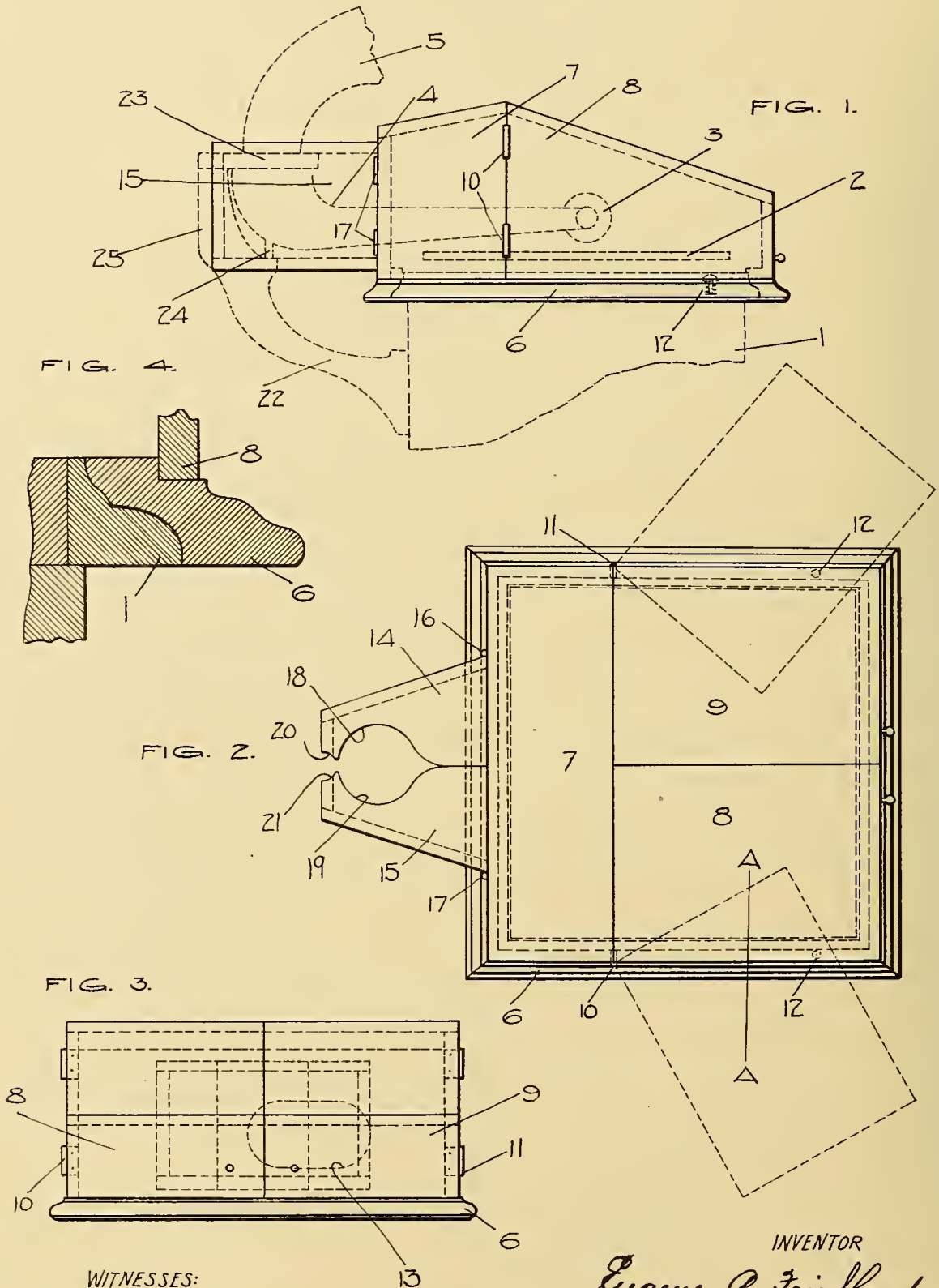




E. A. FRIEDLANDER.  
TALKING MACHINE.  
APPLICATION FILED SEPT. 1, 1910.

1,093,611.

Patented Apr. 21, 1914.



WITNESSES:

Robert M. S. *et al.*  
Jno. T. Obrien

INVENTOR

Eugene A. Friedlander  
BY *J. B. Fay*  
ATTORNEY



# UNITED STATES PATENT OFFICE.

EUGENE A. FRIEDLANDER, OF CLEVELAND, OHIO.

## TALKING-MACHINE.

1,093,611.

Specification of Letters Patent.

Patented Apr. 21, 1914.

Application filed September 1, 1910. Serial No. 580,109.

*To all whom it may concern:*

Be it known that I, EUGENE A. FRIEDLANDER, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Talking-Machines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relates in general to talking machines, and is intended particularly to provide protection for the delicate mechanism employed in such machines.

The general object of the invention, therefore, is to provide a protective inclosure for talking machines which will still allow the swinging movement of the tone-arm, and which will also allow easy access to the reproducing mechanism.

Other advantages of the invention will appear from the detailed description which follows.

To the accomplishment of these and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a side elevation of a machine embodying my invention, certain parts being diagrammatically shown; Fig. 2 is a top plan, certain parts being diagrammatically shown in alternative positions; Fig. 3 is a front elevation, and Fig. 4 is a section on the line A A of Fig. 2.

In the drawing I have diagrammatically shown the inclosure 1, which incloses the motor for rotating the record disk 2. I have furthermore shown the record disk 2, the sound reproducer 3, the sound conveying means 4, and the horn 5, diagrammatically, as these do not enter into the present invention but are of any usual type. Hereafter I shall refer to the record 2 and the reproducer 3 as the sound reproducing mechanism, the sound conveyer or tone-arm 4 being supported so as to permit its forward end to swing over said record, while its rear end

remains connected with the horn or amplifier 5.

The invention proper, comprises an inclosing box or cabinet which is adapted to rest upon the box 1 that forms the inclosure for the talking machine proper. This box includes a relatively fixed part 7 having a skeleton base 6 that is adapted to removably rest upon the top edge of the box 1 inclosing the talking machine. Such box-part 7 is open in front, and to its respective lateral edges, are pivoted two similar parts 8 and 9, these parts being secured to the fixed part 7 by vertical hinges 10 and 11, respectively. The parts 8 and 9 may be provided with suitable knobs or handles, and with spring catches, such as 12, for retaining them in closed position, in which position, they, together with the fixed part 7, completely inclose the top of box 1 with the record 2 and the forward portion of the sound conveyer 4.

The rear wall of the box is provided with an elongated opening 13, through which the tone arm extends. To the rear wall of the box is secured a second box which is constituted of two separate parts 14 and 15 which are hinged respectively to the rear wall on vertical hinges 16 and 17. These parts are provided with imperforate bottoms but their top walls are formed with complementary semi-circular openings 18 and 19, while their rear walls are formed with substantially quarter-cylindrical recesses 20 and 21. The usual bracket 22 is secured to the inclosure 1, and has a vertical post 25 which fits within the recess 20—21, and is further provided with an arm 23 which forms a bearing for the tone-arm and amplifier. The tone-arm is also provided below this bearing with a pivotal post 24, that is supported on said bracket 22.

In use, the double box is placed firmly upon the inclosure 1 for the motor. The tone-arm extends rearwardly through the apertured rear wall of one box, upwardly through the bearing provided by the bracket, the amplifier thence projecting through the opening provided by the two complementary parts of the second box. The complementary pivoted parts of the larger box may be swung open to each side so that the sound reproducing mechanism is completely accessible. After a record has been secured in place and the stylus properly positioned, the box is closed, and con-

sequently the delicate parts of the reproducing mechanism are amply protected, and at the same time the harsh mechanical sound of the mechanism is deadened or destroyed.

5 The amplifier has its usual support from, and bearing in, the bracket. This part of the mechanism is protected by the complementary pivoted parts which form what may be termed the rear box. It will be  
10 noted that this rear box prevents any dirt from getting into the front box through the opening necessary for the movement of the amplifier. At the same time, however, the two parts of the rear box may be swung  
15 wide open to each side so that the parts are completely exposed if desired. By the use of my invention, then, all the delicate mechanism which forms a talking machine may be completely protected from dirt and  
20 dust and at the same time the protective inclosure destroys to a large extent, the mechanical sounds which are so undesirable in machines of this class.

Other modes of applying the principle of  
25 my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such  
30 stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A cabinet for a talking machine of the kind having an amplifier and a swinging  
35 sound conveyer supported on a bracket projecting rearwardly from the box inclosing said machine, said cabinet comprising a relatively fixed part open in front and having a skeleton base adapted to removably  
40 rest upon the top edge of said box said fixed part also having a hole in its rear wall for

said sound conveyer; two similar parts vertically pivoted to the respective lateral edges of said relatively fixed part, said parts being adapted to completely inclose the top  
45 of said box; and a second box secured to said rear wall, said second box including two parts pivoted to said wall on vertical axes and formed with complementary, substantially semi-circular openings in their  
50 top walls, so as to be adapted to inclose the rear portion of said sound conveyer without interfering with its movement.

2. A cabinet for a talking machine of the kind having an amplifier and a swinging  
55 sound conveyer supported on a bracket projecting rearwardly from the box inclosing said machine, said cabinet comprising a relatively fixed part open in front and having a skeleton base adapted to removably rest  
60 upon the top edge of said box said fixed part also having a hole in its rear wall for said sound conveyer; two similar parts vertically pivoted to the respective lateral edges of said relatively fixed part, said parts being  
65 adapted to completely inclose the top of said box; and a second box secured to said rear wall, said second box including two parts pivoted to said wall on vertical axes and formed with complementary, substantially  
70 quarter-cylindrical recesses in the outer sides of their rear walls, so as to be adapted to inclose the rear portion of said sound conveyer without interfering with its movement.  
75

Signed by me this 27th day of August, 1910.

EUGENE A. FRIEDLANDER.

Attested by—

ROBERT M. SEE,  
JNO. T. OBERLIN.

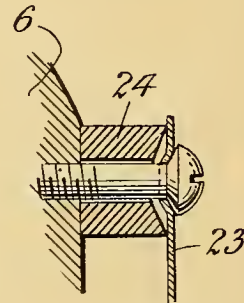
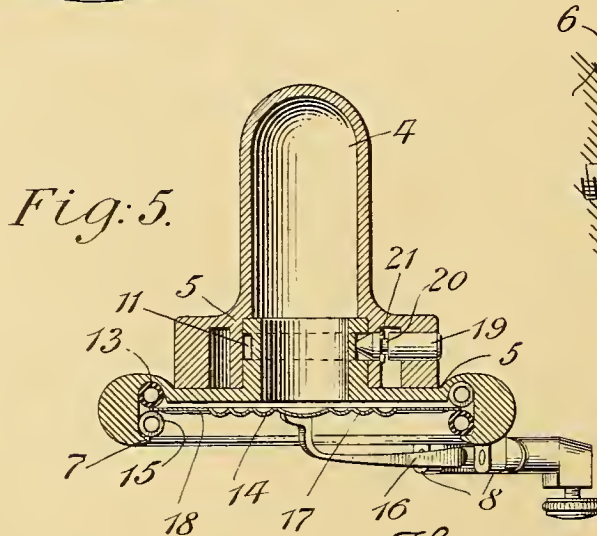
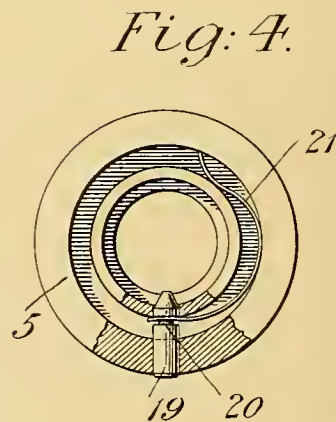
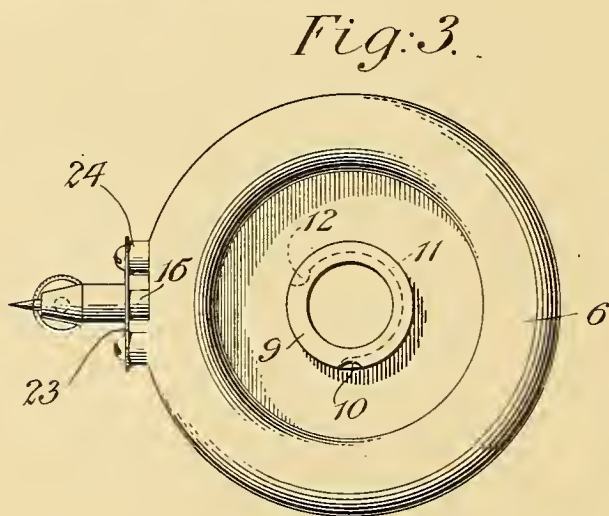
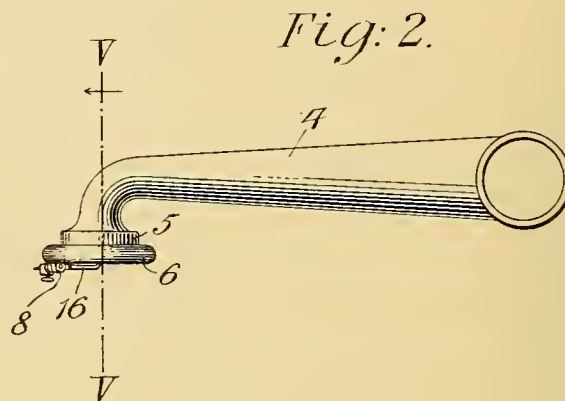
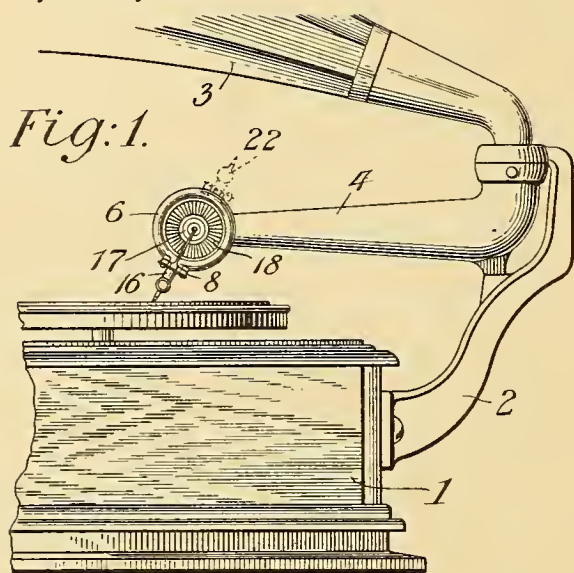




T. H. MACDONALD.  
SOUND BOX AND MOUNTING THEREFOR.  
APPLICATION FILED JULY 1, 1909.

1,093,710.

Patented Apr. 21, 1914.



Witnesses:  
W. A. Hood  
R. C. Fitzhugh.

Inventor,  
Thomas H. Macdonald  
By his Attorneys,  
Mauw, Cameron Lewis & Massie

# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-BOX AND MOUNTING THEREFOR.

1,093,710.

Specification of Letters Patent.

Patented Apr. 21, 1914.

Application filed July 1, 1909. Serial No. 505,459.

*To all whom it may concern:*

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Sound-Boxes and Mountings Therefor, which improvement is fully set forth in the following specification.

10 This invention relates to talking-machines, particularly the type for carrying a disk record with lateral undulations.

The invention comprises an improved construction of sound-box and an improved manner of mounting it, preferably upon the well-known horizontally-swinging hollow arm that connects with the flaring horn.

The invention consists further in certain details that will be pointed out and claimed.

20 The invention will be best understood by reference to the annexed drawings that form a part of the specification.

In the drawings, Figure 1 is a side elevation of the sound-box and arm attached to a machine. Fig. 2 is a top view of the sound-box and the arm on which it is mounted. Figs. 3 and 4 are details on a larger scale showing respectively the adjacent faces of the sound-box and of the end of the arm. 30 Fig. 5 is a transverse section, through the line V—V of Fig. 2. Fig. 6 is a detail showing the manner of securing the stylus-bar to the sound-box.

In the drawings, 1 represents the cabinet of an ordinary disk talking-machine, having the standard 2 that carries the horn 3, and likewise the hollow arm or tone arm 4, which is preferably mounted to swing in only a horizontal plane. The sound-box 40 is mounted detachably upon the free end of this arm, and has axial play thereon. This free end of the arm 4 is provided with an elbow lying in the same horizontal plane, and presents at 5 a face parallel to the diaphragm of the sound-box. The sound-box 6 is mounted upon this portion 5 by a bayonet joint, and is capable of axial movement thereon to permit ready substitution of fresh reproducing-needles.

50 The preferred form of sound-box 6 is composed of a single part having in front the circular flange forming a cavity and having the overhanging lip 7, and an annular

groove around the bottom of the cavity; having likewise the usual perforated ears 8 55 for supporting the stylus-bar; and likewise the tubular extension 9 at its rear. In this tubular extension is provided the female member of the bayonet joint, consisting of the comparatively shallow straight entrance 60 portion 10, the deeper annular portion 11, and at the end of the latter the seat 12 (which is still deeper). A small rubber tube 13 is seated as a gasket in the annular groove in the cavity; the diaphragm 14 is 65 inserted within the cavity and rests upon this gasket 13; and a similar rubber-tubing 15 is introduced beneath the lip 7, the two gaskets securing the diaphragm in place as shown. The stylus-bar 16 has fast there- 70 to the usual transverse spring-wings that are secured to the ears 8.

The diaphragm 14 is preferably a disk of aluminum or other metal; its central portion is composed of a plurality of concentric 75 circular corrugations 17, from which extend a plurality of radial corrugations 18, which gradually diminish to the outer margin of the disk (where it is engaged by the gaskets). 80

The bore in the hollow arm 4 is, at 5, adapted to receive snugly the tube 9 at the back of the sound-box. Projecting into this bore is a stud 19, which constitutes the male member of the bayonet-joint. By 85 making this stud a spring-pressed plunger, and providing it with a tapered tip, it will be forced into and out of the deep seat 12, to lock the sound-box in operative position (Fig. 1), and will prevent accidental re- 90 moval of the entire sound-box when the stud is opposite the shallow straight portion 10. Preferably this stud 19 is located in a chamber passing radially through the wall of face 5; and it is provided with a 95 reduced portion 20 in which fits the slotted end of a spring 21 to force the stud inward. The face 5 of the tube is cut away to receive the spring 21.

The annular portion 11 of the bayonet 100 joint on the sound-box 6 preferably extends nearly three-quarters of the way around the tube 9. The bayonet joint is so arranged that when the plunger 19 is engaged in seat 12 the stylus will be in the operative posi- 105 tion shown in Fig. 1; and when it is de-



sired to remove the needle and substitute a fresh one, the sound-box 6 can be turned axially so as to bring the needle uppermost, as indicated by dotted lines 22 in Fig. 1.

5 Preferably the spring-wings 23 of the stylus-bar are secured to the sound-box under tension. Between each wing 23 and the adjacent shoulder 8 is interposed a collar 24 having its outer end cupped out. Each  
10 screw that secures the wing to the shoulder is provided beneath its head with a conical surface; so that wings 23 are forced down as shown in Fig. 6.

I have described my invention with some  
15 particularity but only for the sake of clearness, since changes may be made in the construction and arrangement of the parts, and parts of the invention may be used to the exclusion of other parts, without departing  
20 from the spirit of my invention.

Having thus described my invention, I claim:

In a sound-box for talking-machines, the combination of the casing containing the diaphragm, the stylus-bar therefor connect- 25 ed to said diaphragm and carrying a transverse spring-plate perforated at each end, a sleeve cupped at its outer end and located between each end of said spring-plate and said casing, and a screw passing through 30 each perforation and sleeve into said casing and having beneath its head a conical surface.

In testimony whereof I have signed this specification in the presence of two subscrib- 35 ing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,

L. B. NICHOLSON.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

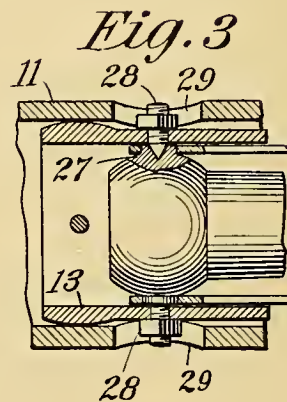
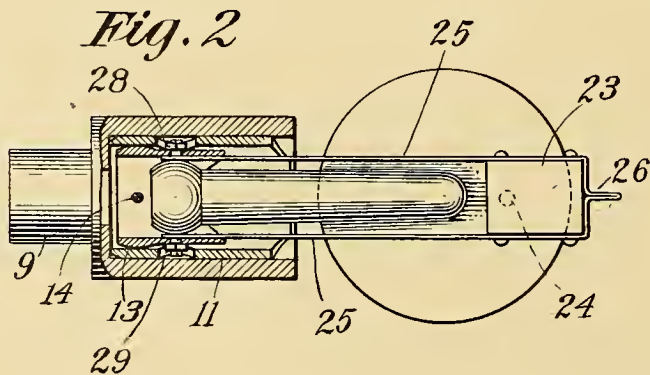
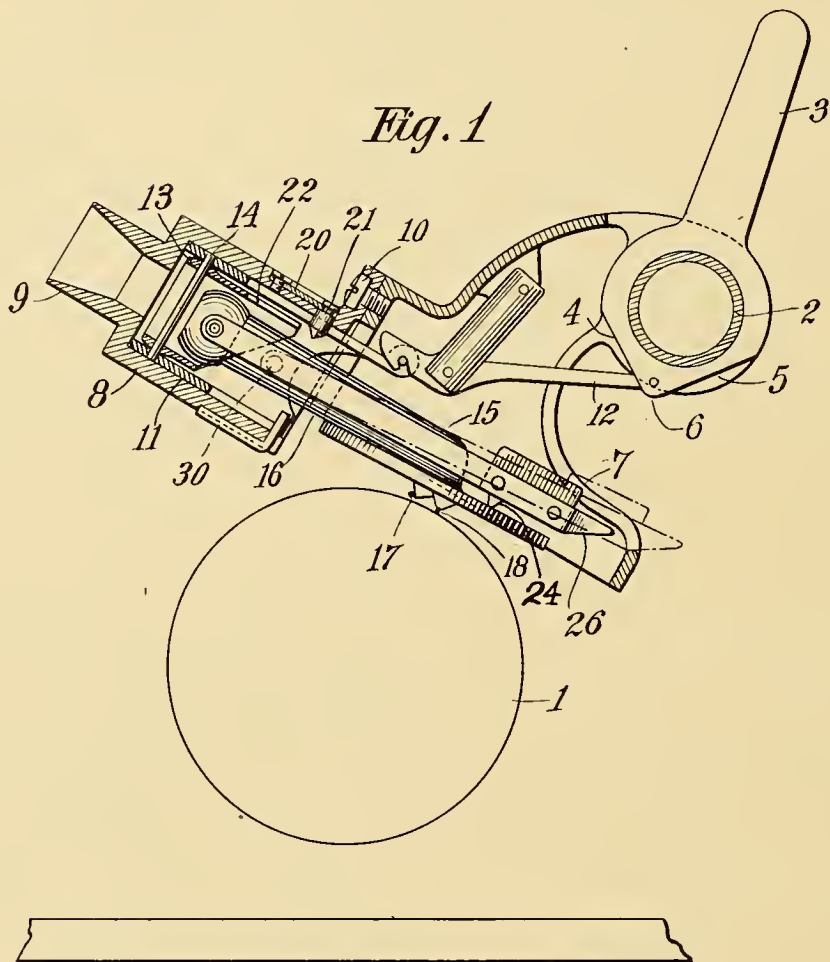




J. J. SCULLY.  
 COMBINED RECORDER AND REPRODUCER.  
 APPLICATION FILED OCT. 28, 1912.

1,093,732.

Patented Apr. 21, 1914.



Witnesses:  
 Rich C. Fitzhugh.  
 Jas H. Anderson.

Inventor  
 John J. Scully.  
 By his Attorneys  
 Mauro, Cameron, Lewis & Macie

# UNITED STATES PATENT OFFICE.

JOHN J. SCULLY, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

COMBINED RECORDER AND REPRODUCER.

1,093,732.

Specification of Letters Patent.

Patented Apr. 21, 1914.

Application filed October 28, 1912. Serial No. 728,113.

*To all whom it may concern:*

Be it known that I, JOHN J. SCULLY, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Combined Recorders and Reproducers, which invention is fully set forth in the following specification.

This invention relates to graphophones or talking-machines whose "speaker" or "diaphragm-head," sometimes referred to as the "recorder-reproducer," is provided with two styli upon the one diaphragm, and is adapted to be shifted longitudinally for use interchangeably as a recorder or as a reproducer.

More particularly, the present invention may be regarded as an improvement upon the structure set forth in the prior Macdonald Patent No. 1,003,625, granted September 19, 1911. In instruments of this character it is desirable that the recorder-reproducer be comparatively light when recording, but comparatively heavy when reproducing; and in said Patent No. 1,003,625, this is accomplished by means of a vertically-movable weight pivoted upon the neck of the diaphragm-head in such manner that it will bear its full weight upon the upper face of said head during the operation of reproducing, but will be held out of contact therewith during recording. It is also desirable that the recorder-reproducer be capable of lateral as well as vertical play when reproducing, but be locked absolutely against lateral play during recording; and in said patent this is accomplished by means of the engagement of the forward portion or nose of said weight within a fixed support. However, in the practical operation of the device of said prior Macdonald patent, it has been found that during the operation of recording, the suspended weight is so connected to the stem or neck of the recorder-reproducer as to exert upon the latter a drag, which, although slight, is sometimes appreciable in preventing perfect accuracy of operation; and it has also been found that, owing perhaps to lack of utmost precision in wholesale manufacturing operations, the unintended looseness of the parts sometimes permits a slight lateral play of the diaphragm-head during recording.

According to the present invention, the vertically-swinging weight, though mounted upon the diaphragm-head or recorder-re-

producer, is pivoted thereon concentrically of the horizontal pivot or axis of the latter, so that the weight and the recorder-reproducer, in swinging vertically, swing independently of each other and without interference from each other.

One feature of the invention, then, consists of the novel arrangement and mounting of the weight.

Another feature of the invention consists of improved means for securing the recorder-reproducer against lateral play when recording. And the invention consists further in the various features of construction and arrangement hereinafter pointed out and claimed.

The invention will be best understood by reference to the annexed drawings, in which—

Figure 1 is an end view, partly in transverse section, of a dictation graphophone equipped with a preferred embodiment of the present invention: Fig. 2 is a longitudinal section through the novel mounting of the speaker and of the weight; and Fig. 3 is a similar view on an enlarged scale.

In these drawings the cylindrical record-tablet or blank-tablet 1, the carriage-sleeve 2 (which surrounds the feed-screw, not shown) and the cam-ring having the handle 3 and the two cut-away portions 4 and 5 with the intermediate cam-nose 6, are all as set forth in said Patent No. 1,003,625. So also are the "carriage-case," having the vertical slot or seat 7 at its lower forward portion (beneath the feed-screw), with the tubular portion 8 and its reduced nipple 9 secured to the main casing by screw 10; also the telescoping-sleeve 11, connected to nose 6 by link 12, and the collar 13 pivoted in said sleeve by pin 14; also the recorder-reproducer 15, with its tubular neck 16 (whose spherical rear end is to be mounted on a horizontal axis within said collar), and its recording-stylus 17 and reproducer-stylus 18 carried by the diaphragm (not shown). All the foregoing are constructed and operated as set forth in said prior patent.

On the upper face of the tubular member 8 (preferably in a longitudinal groove) is secured the flat spring 20, that carries the plunger 21 which protrudes through a longitudinal slot in the telescoping-sleeve 11, and is provided with a conical nose adapted to enter the aligned slot or groove 22 in the



collar 13, so as to exert pressure upon the walls of the collar when the latter is shifted forward (into the recording-position). This insures that, during recording, the collar 13 and thereby the diaphragm-head are locked against any lateral play.

23 represents the weight, a block of lead or the like, which may be provided on its lower side with the boss or cushion 24 of soft rubber or the like adapted to rest upon the upper face of the diaphragm-head. To the weight is secured the spring-metal strip which provides the two arms 25—25 and the forwardly-projecting sloping nose 26, adapted (when protruded into recording-position) to slide into and rest upon the seat 7 of the main casing. The rear ends of said arms 25 are apertured to fit over and turn freely upon the two alined bosses 27, upon opposite sides of the spherical enlargement at the rear end of the neck 16 of the recorder-reproducer. Preferably said bosses are afterward "upset" to secure said arms in place. Next, the collar 13 having been secured in the sleeve 11 by the pin 14, the recorder-reproducer and the weight (pivoted together as just described) are inserted into the collar; and set-screws 28 (with their jam-nuts) are inserted through the cutaway portions 29 in the sleeve and through screw-threaded openings in the collar, so that their cone-points will enter the cone-seats in the bosses 27 (see Fig. 3). These cone-bearings are of course in horizontal alinement (parallel to the feed-screw and the mandrel), and are concentric with the axes of the arms 25. These assembled parts (diaphragm-head, weight, collar, and telescoping-sleeve) are inserted into the tubular-member 8, which in turn is secured to the main casing by the screw 10, the link 12 being properly connected as shown in Fig. 1.

The full lines in Fig. 1 represent the instrument in the position of reproducing. The block 23 is applying its full weight upon the recorder-producer, and the two will rise and fall as one, and likewise can swing to either side upon the single pivot 14. The recording-position is indicated by the dotted lines in Fig. 1: the weight is suspended at one end at 30, and at the other end in the seat 7; while the diaphragm-head, pivoted at 30, can rise and fall entirely unaffected by the presence of the weight. In this position also, the spring-pressed

plunger 21 locks the collar 13, and thereby the recorder-reproducer, against any lateral play whatever.

The invention has thus been described with considerable fullness of detail, but only for the sake of clearness; since the invention is not limited to the precise construction and arrangement of the parts as shown, and parts of the invention can be used to the exclusion of other parts, or modifications resorted to, without departing from the spirit of the invention.

The invention having been thus described, what is claimed is:

1. In a recorder-reproducer for talking-machines, the combination with a head pivoted to swing laterally as well as vertically and having a diaphragm carrying a recording-stylus and a reproducing-stylus, and means for shifting either stylus into operative position while removing the other, of a weight-device pivoted upon said head to swing concentrically therewith in the same vertical plane and adapted to apply pressure upon the reproducing-stylus during reproducing and to have its entire weight held automatically lifted so as not to apply pressure to the recording-stylus during recording.

2. In a recorder-reproducer for talking-machines, the combination with a head pivoted to swing laterally as well as vertically and having a diaphragm carrying a recording-stylus and a reproducing-stylus, and means for shifting either stylus into operative position while removing the other, of a boss arranged on each side of the rear of said head concentrically of its horizontal pivot, a weight-device pivoted upon said bosses so as to swing concentrically with said head in the same vertical plane and with its free end adapted to bear upon said head during the reproducing-operation, and a seat for automatically holding the free end of said weight-device lifted out of contact with said head during the recording-operation.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN J. SCULLY.

Witnesses:

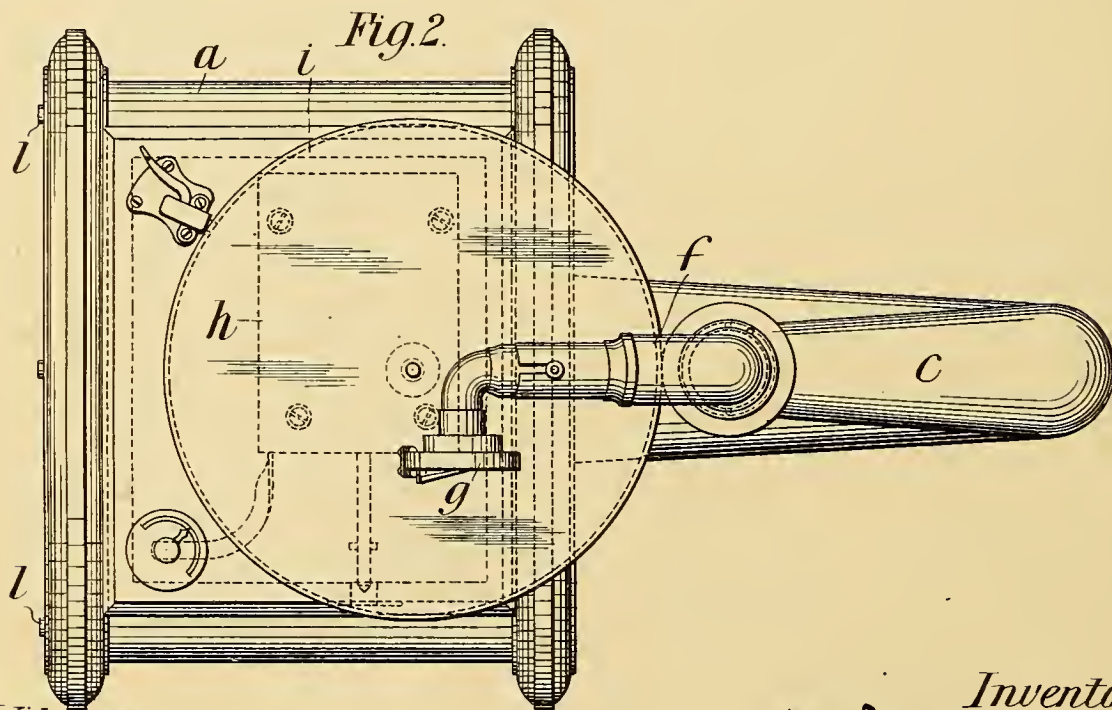
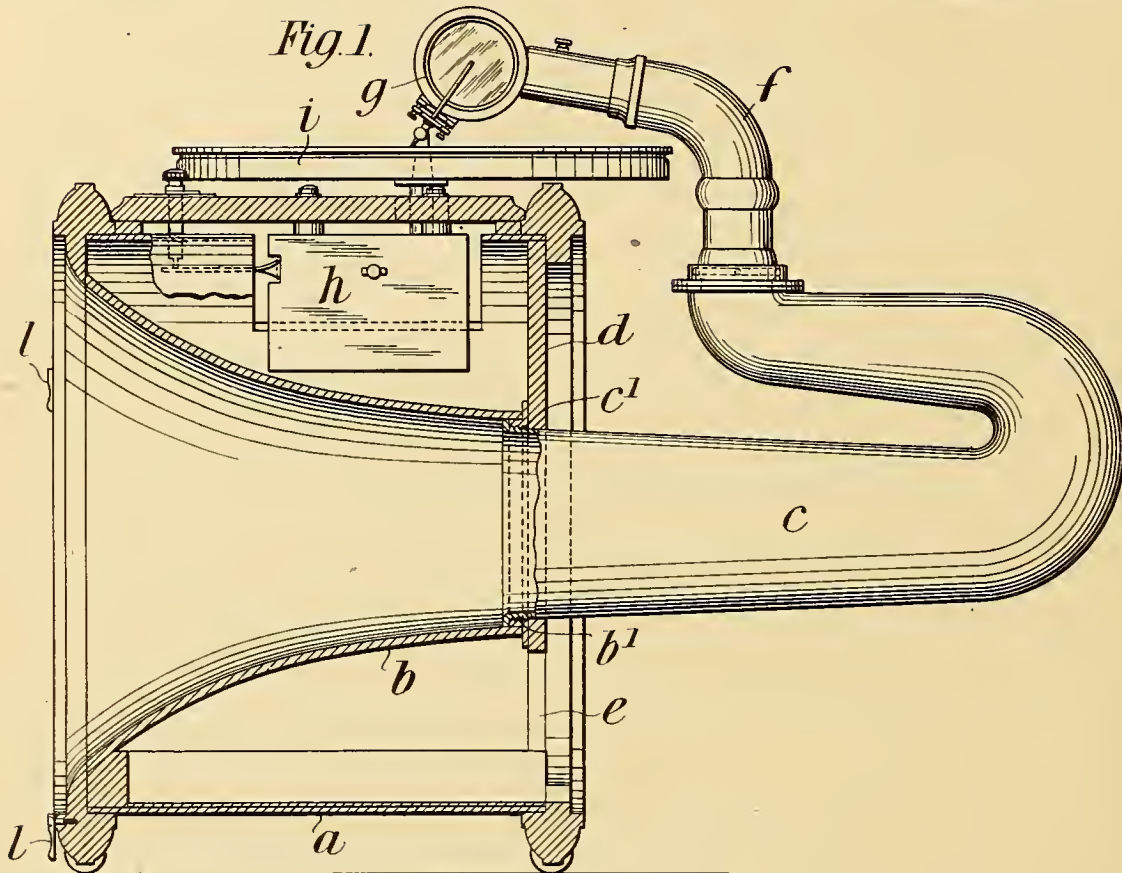
FRANK L. CAPPS,  
J. S. GRIFFITH.



1,094,067.

Patented Apr. 21, 1914

2 SHEETS-SHEET 1.



Witnesses.

J. K. Moore  
J. F. Doyle.

Inventor.

Joshua Green.  
32  
William Green,  
attys.



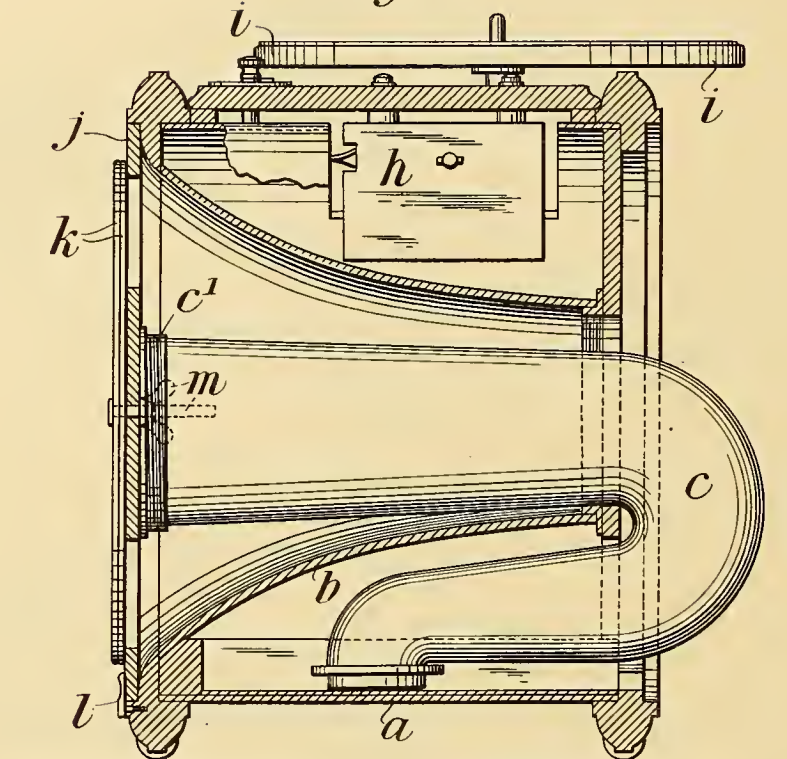


1,094,067.

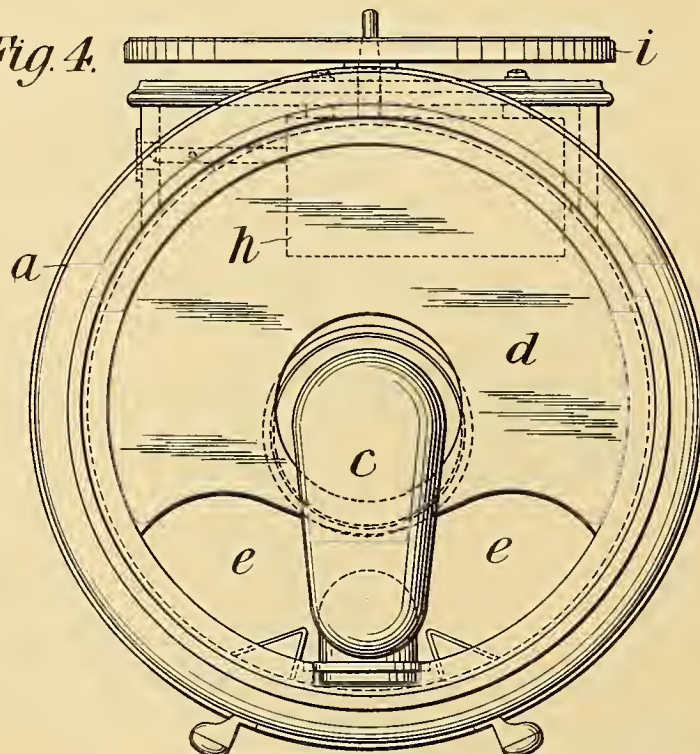
Patented Apr. 21, 1914.

2 SHEETS—SHEET 2.

*Fig. 3.*



*Fig. 4.*



Witnesses.

J. K. Moore  
Wm. F. Doyle.

Inventor.

Joshua Green  
by  
William F. Doyle  
att'y

# UNITED STATES PATENT OFFICE.

JOSHUA GREEN, OF LONDON, ENGLAND.

## TALKING-MACHINE.

1,094,067.

Specification of Letters Patent.

Patented Apr. 21, 1914.

Application filed May 26, 1913. Serial No. 769,961.

*To all whom it may concern:*

Be it known that I, JOSHUA GREEN, a subject of the King of Great Britain, residing at 27 Pyrland road, Canonbury, London, England, have invented new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking machines or gramophones and has mainly for its object to provide a machine which, while possessing a horn of full, or approximately full dimensions, yet when not required for use can be packed into a small space, thus rendering the machine eminently suitable for many purposes, for example, for transport from place to place.

According to my invention I construct a gramophone or talking machine with a horn made in a number, preferably two, of parts, one of which is fixed within the casing of the machine and the other or others is or are adapted to telescope relatively thereto, so that when not required for use the said part or parts can be pushed partially or wholly within the fixed portion, but when required for use can be drawn out and turned into the position to receive the tone-arm.

My invention can advantageously be employed in combination with the known type of machine in which the horn is placed below the motor and in which the case of the machine is of cylindrical construction. With such a machine I combine a horn consisting of a fixed or stationary portion arranged within the said cylinder so that its larger or flared end is flush with one end thereof, and of a second movable elbow shaped portion which can telescope into the fixed part. This movable part, which slides within the fixed portion, is preferably also of a taper shape so that when the complete horn is extended, it is of the normal, or approximately the normal contour. The meeting ends of the two parts of the horn are preferably screw-threaded, or provided with any other suitable device, by means of which they can be locked in position when the movable elbow part is drawn out and turned to bring it into the proper position for receiving the tone arm, which, in the form of gramophone under consideration, is at the top of the cylinder body. The end of the casing which receives the moving elbow part of the horn is closed with a cover, which, however, is provided with a slotted portion

at its lower part to receive the extremity of the horn when the latter is turned down and telescoped into the fixed horn part. It will thus be seen that when the machine is dismantled it occupies a space which practically corresponds with that of the casing. Furthermore, means may advantageously be provided in conjunction with the flared end of the horn whereby the said end may be adapted to receive a carrier or holder for records or the usual turn-table when the machine is not required for use. The holder or turn-table thus constitutes a cover to the open end of the horn which may serve as a receptacle for the tone-arm.

In the accompanying drawings:—Figure 1 is a sectional side view of one form of gramophone machine made according to the invention. Fig. 2 is a plan view thereof. Fig. 3 is a view similar to Fig. 1 but showing the horn in the collapsed position, and Fig. 4 is an end view showing the parts in the position illustrated in Fig. 3.

*a* represents the casing which is here shown of cylindrical construction and is preferably made of ply-wood. *b* is the fixed portion of the horn which is located within the said cylinder *a* in such a position that the larger or flared end thereof is flush with one end of the cylindrical casing *a* as will be clearly obvious on reference to Figs. 1 and 3.

*c* is the movable elbow portion of the horn which slides within the fixed portion and is of a taper shape and the extremity of which is provided with an external screw-thread *c*<sup>1</sup>, which is adapted to engage with an internal screw-thread *b*<sup>1</sup> upon the inner end of the fixed portion *b* of the horn, these screw-threads enabling the two parts of the horn to be rigidly secured in the extended position hereinafter described.

*d* is the cover which is fitted to the end of the casing which receives the moving elbow part *c* of the horn and *e* is the slot formed at the lower part of the cover for the reception of the said elbow part *c*.

*f* is the tone-arm which is carried by the elbow *c* and *g* the sound-box fitted to the end of the tone-arm in the usual way.

*h* is the motor which is of ordinary construction and is fitted within the casing *a* in the space between the horn and the top of the casing *a* and *i* is the turn-table which is driven from the motor in the ordinary manner. With this arrangement it will be



understood that when the gramophone is not required for use the tone-arm *f* is removed from the elbow portion *c* of the horn which is then turned so as to disengage the screw joint *b*<sup>1</sup>, *c*<sup>1</sup> after which the said elbow *c* can be pushed into the stationary portion *b*, and through the slot *e* in the cover *d* of the casing so that it eventually assumes the position indicated in Figs. 3 and 4. When the machine is to be used the reverse operation is carried out, that is to say, the elbow portion *c* of the horn is withdrawn from the stationary part *b*, turned so as to engage the screw-thread *b*<sup>1</sup> and *c*<sup>1</sup> and brought into the proper position to receive the tone-arm *f*, this position of the parts being shown in Figs. 1 and 2.

When the machine is collapsed or packed as shown in Figs. 3 and 4 the larger or flared end of the horn can receive the tone-arm *f* and can be closed either by means of the turn-table *i* which can be placed over the same and held in position by suitable clips or by means of a record or disk carrier *j* shown in Fig. 3 with two records or disks *k* in position, and retained in place by means of the pivoted buttons or clips *l* the records being attached thereto by means of the clamping screw and nut *m* Fig. 3.

Claims.

1. A talking machine comprising a casing, a horn made of two or more telescopic parts, one part being fixed within the casing and the other part or parts being designed to telescope axially within the fixed part from the small end of said fixed part toward its large end and means whereby the telescoping parts can be locked in the extended position, substantially as described.

2. A talking machine or gramophone comprising a cylindrical casing having a horn made of two parts one of which is fixed within the casing and has its flared end flush with one end of the latter and the other or elbow portion of which is designed to telescope axially within the fixed portion from the small end of said fixed part toward its large end, the meeting ends of the said two parts being provided with a locking device.

3. A talking machine comprising a cylindrical casing having a horn made of two parts, one of which is fixed within the casing and has its flared end flush with one end of the casing and the other portion of which is designed to telescope axially within the fixed portion from the small end of said fixed part toward its flared end, the meeting ends of the said two parts being provided with a locking device, a turn-table mounted on the top of said casing, said turn-table being adapted to be placed over the front of the casing when the machine is not in use, and means for locking said turn-table to the front of the casing.

4. A talking machine comprising a casing, a horn provided in said casing and having its flared end flush with one end of said casing and its small end provided with one portion of a detachable locking connection, and an elbow horn section having a flared end provided with the other portion of the detachable locking connection adapted to engage the locking connection on the horn when the machine is in use, and be disengaged therefrom when not in use, the flared end of the elbow horn section being adapted to rest in the horn when the apparatus is not in use and its small end being adapted to rest between the horn and the casing.

5. A talking machine comprising a casing, a horn provided in said casing and having its flared end flush with one end of said casing, the horn being gradually tapered from the flared end to its small end thereby providing a space between the horn and the casing, an interior screw thread provided in the small end of said horn, and an elbow horn section having its flared end provided with an exterior screw thread adapted to engage said interior screw thread when the machine is in use, the flared end of the elbow horn section being adapted to rest in the horn and its small end adapted to rest in the space between the horn and the casing when the machine is not in use.

JOSHUA GREEN.

Witnesses:

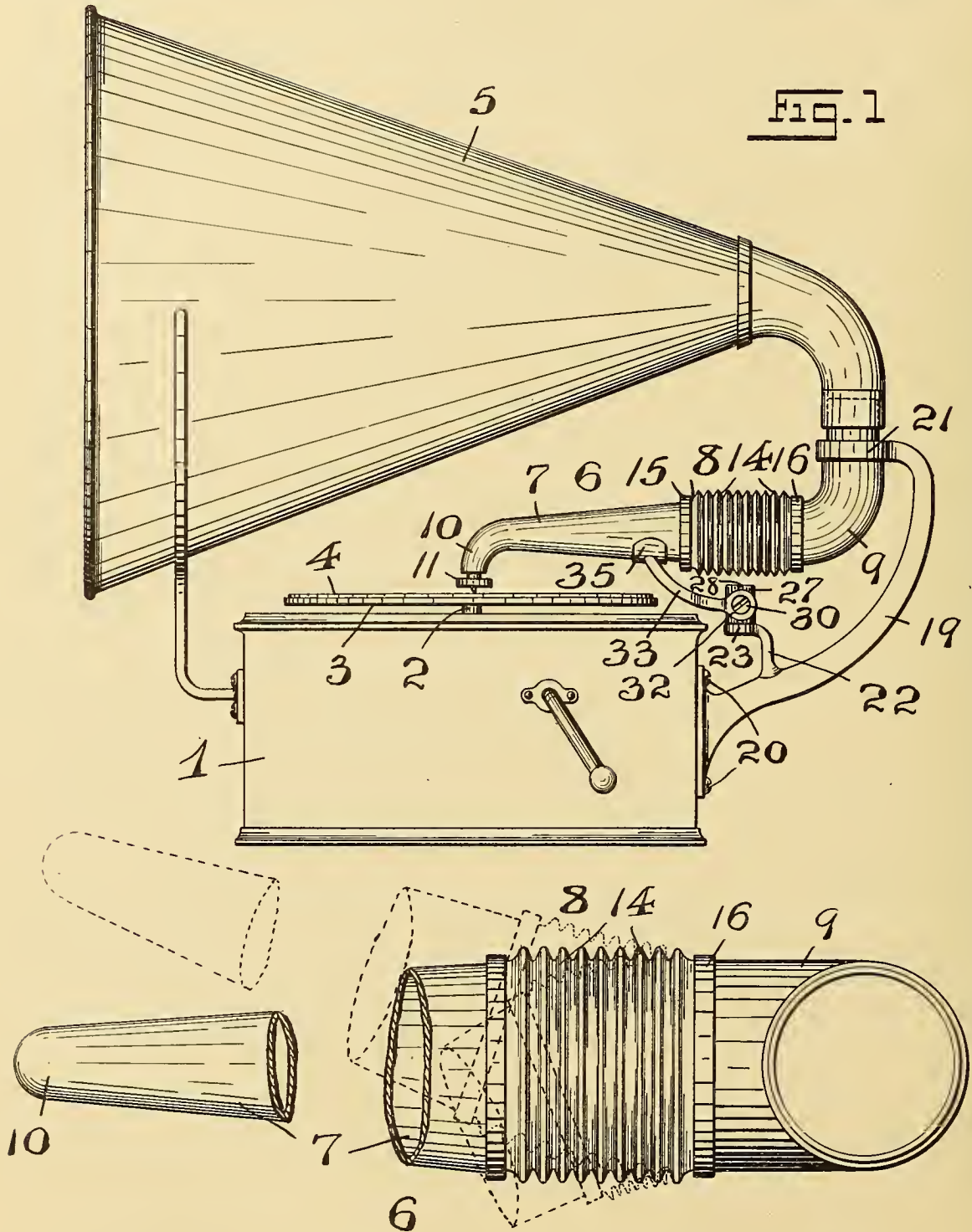
JOHN E. BOUSFIELD,  
C. G. REDFERN.



E. PELTOVITZ.  
TONE ARM FOR TALKING MACHINES.  
APPLICATION FILED OCT. 31, 1911.

1,094,166.

Patented Apr. 21, 1914  
3 SHEETS—SHEET 1.



WITNESSES:  
*Fredk W. Krautzel*  
*Harry P. Gliffer*  
Fig. 2

INVENTOR:  
Edmund Peltovitz,  
BY *Fraentzel and Richards,*  
ATTORNEYS



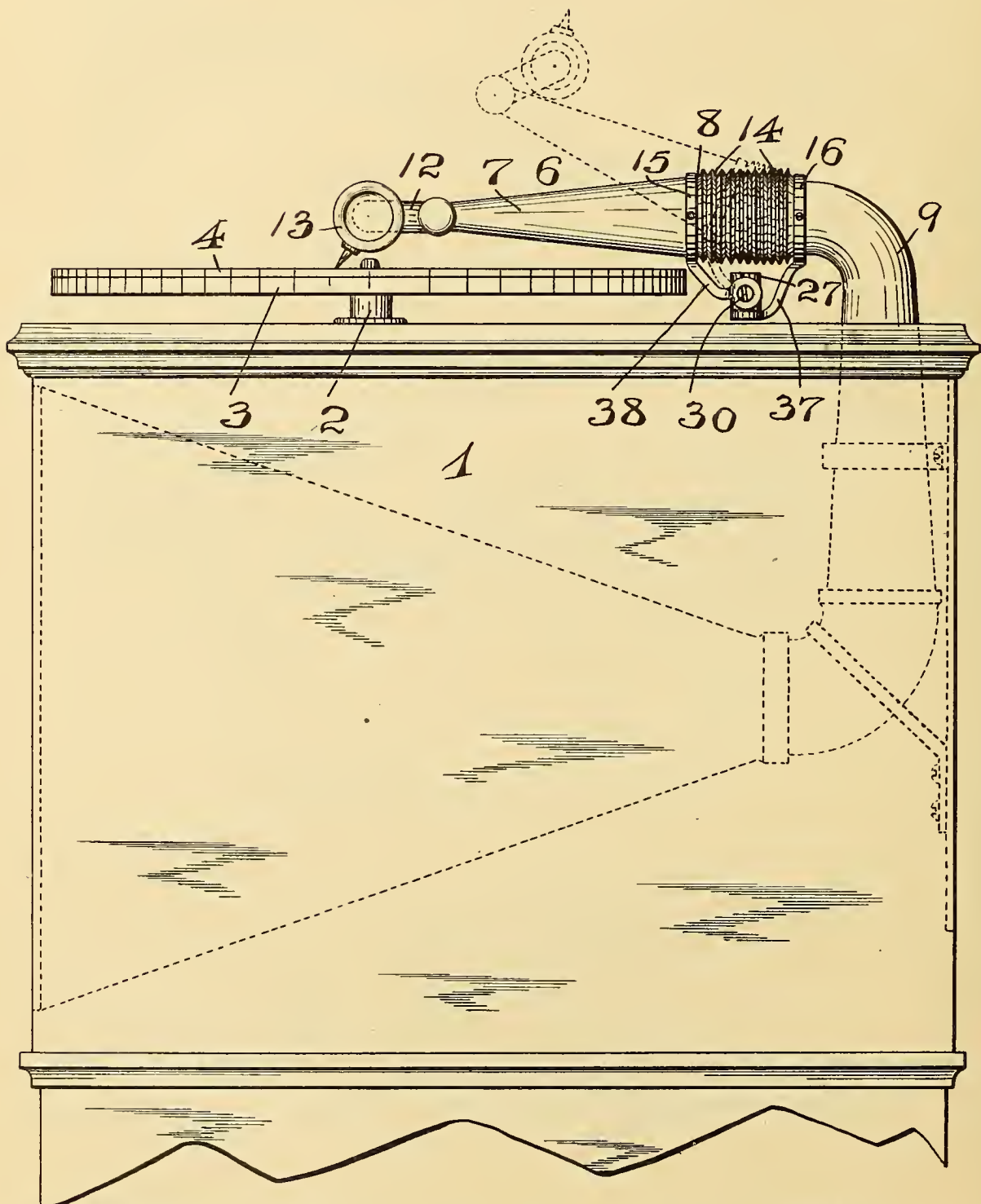


E. PELTOVITZ.  
TONE ARM FOR TALKING MACHINES.  
APPLICATION FILED OCT. 31, 1911.

1,094,166.

Patented Apr. 21, 1914.

3 SHEETS—SHEET 2.



WITNESSES:  
*Frank W. Frauentzel*  
*Harry E. Pfeiffer*

Fig. 3

INVENTOR:  
*Edmund Peltovitz,*  
BY *Frauentzel and Richards,*  
ATTORNEYS



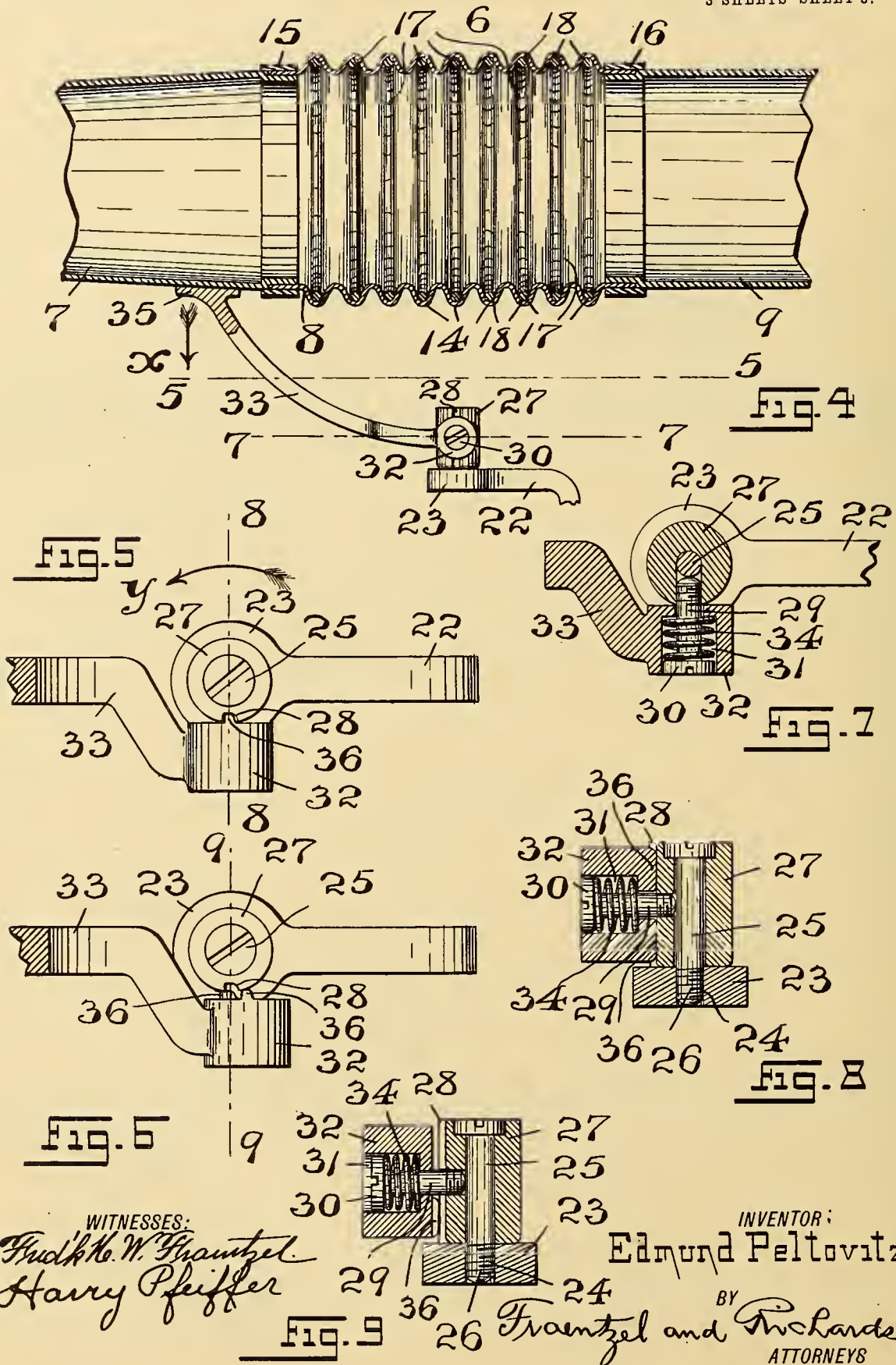


E. PELTOVITZ.  
TONE ARM FOR TALKING MACHINES.  
APPLICATION FILED OCT. 31, 1911.

1,094,166.

Patented Apr. 21, 1914.

3 SHEETS-SHEET 3.



WITNESSES:

Frank W. Fraentzel  
Harry Pfeiffer

INVENTOR:

Edmund Peltovitz,

BY

Fraentzel and Richards,  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

EDMUND PELTOVITZ, OF EAST ORANGE, NEW JERSEY.

## 1 TONE-ARM FOR TALKING-MACHINES.

1,094,166.

Specification of Letters Patent.

Patented Apr. 21, 1914.

Application filed October 31, 1911. Serial No. 657,783.

*To all whom it may concern:*

Be it known that I, EDMUND PELTOVITZ, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Tone-Arms for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention has reference, generally, to improvements in tone arms for talking machines; and, the invention relates, more particularly, to a novel form of accordion-plaited stem for use with machines of the character above stated and with the amplifying horns employed with such machine, with a view of providing a means which will permit the sound box to be readily raised from its reproducing contact with the record cylinder of the phonograph, or from the record-disk of the gramophone or talking machine, without in the least affecting the relatively fixed position of the amplifying horn; and, also to provide a tone-arm which will swing laterally as the sound box moves along the cylinder or from the central portion of the disk to the outer circumferential edge of the latter.

The invention has for its further object to provide a simple and effectively operating means which will modify the sound and will overcome absolutely the metallic or squeaky sounds caused by the usual amplifying horns.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the following detailed description of the present invention.

With the various objects of the invention in view, the said invention consists, primarily, in the novel accordion-plaited tone-arm for phonographs and talking machines of the various constructions, and the amplifying horns therefor, hereinafter set forth; and, the said invention consists, furthermore, in the general arrangements and com-

binations of the various devices and parts, as well as in the details of the construction of the same, all of which will be more finally embodied in the clauses of the claim which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation of one form of talking machine and amplifying horn, with an accordion-plaited tone-arm made according to and embodying the principles of the present invention, said view illustrating also in connection with the said devices, one means for securing the tone-arm in its operative position with relation to the record-disk of the machine and to the amplifying horn. Fig. 2 is an enlarged top view of portions of the said accordion plaited tone-arm, said view illustrating, also, the oscillatory relation of the parts of the said arm to each other. Fig. 3 is a view similar to that represented in said Fig. 1, showing the application of the accordion-plaited tone-arm to that style of talking machine or gramophone in which the amplifying horn is contained in the case or box of the talking-machine. Fig. 4 is an enlarged longitudinal vertical section of the accordion-plaited or bellows-portion of the tone-arm; Fig. 5 is a horizontal section of one form of supporting bracket for the tone-arm, said section being taken on line 5—5 in said Fig. 4, looking in the direction of the arrow *x*, and the parts of the supporting bracket being shown in their normal initial positions. Fig. 6 is a view similar to that represented in said Fig. 5, the parts of the supporting-bracket being represented in their operated positions when one of the arm-sections, with which the sound box is connected, is slightly raised so as to elevate the sound box above the surface of and out of contact with the record-disk or cylinder. Fig. 7 is a horizontal section taken on line 7—7 in said Fig. 4; Fig. 8 is a transverse vertical section, taken on line 8—8 in Fig. 5; and Fig. 9 is a similar section, taken on line 9—9 in Fig. 6, all of said views being made upon a much larger scale.

Referring now to the several figures of the drawings, the reference-character 1 in-



dicates any usual form of case or box in which is arranged the operating-mechanism, in this instance that of a talking machine, 2 indicating the usual motor-driven shaft, 5 and 3 rotary supporting table mounted upon said shaft, and upon which is removably arranged a record-disk, as 4.

The reference-character 5 indicates any suitable form of amplifying horn which 10 may be arranged upon the outside of the said case or box, as shown in Fig. 1 of the drawings, or which may be placed within the case or box, as indicated in Fig. 3.

The accordion-plaited tone-arm is indicated by the reference-character 6, and consists, usually, of three members or sections 7, 8 and 9 which are suitably connected and operate in substantially the manner to be presently more fully set forth. The said 20 arm-section 7 is a piece of metal tubing which tapers preferably in the manner shown, and in the goose neck 10 of which is mounted a suitable sound box, as 11, see Fig. 1; or, as represented in Fig. 3 of the drawings, the said arm-section 7 may be provided 25 with a pivotal or swinging member, as 12, with which is connected a sound box 13 of the form represented in said Fig. 3. The arm-section 9 is also a piece of metal tubing, 30 preferably in the form of an elbow, the elbow in the representation of the parts illustrated in Fig. 1 of the drawings, extending in an upward direction, while the elbow in the representation of the parts illustrated in said Fig. 3 extends in a downward 35 direction, but in each case the small tubular end-portions of the amplifying horns are suitably connected with said elbows, substantially in the manner shown.

40 The arm-section 8 is intermediately secured and suitably connected with the respective arm-sections 7 and 9, said section 8 being made of a suitable non-metallic and flexible fabric, such as leather, or the like, 45 and consisting of a suitable number of accordion-like plaits, as 14, or being made in the form of a bellows, substantially as shown in the several figures of the drawings. One manner of connecting the end-portions of 50 said tubular and accordion-plaited or bellows-like arm-section 8 to the respective metal sections 7 and 9 is by means of suitably formed binding rings or bands, as 15 and 16, as represented in Figs. 1, 2, 3 and 4 55 of the drawings. In order that the said accordion-plaited or bellows-like arm-section 8 shall have proper rigidity or stiffness, and still not interfere with the flexibility of said section, suitably formed rings 17 of metal, 60 or other suitable material, are preferably arranged within the several portions 18 of said section 8, substantially as shown in said Fig. 4 of the drawings, and the purpose of which is self-evident.

One means for operatively mounting the 65 accordion-plaited or bellows-like tone-arm above the case or box 1 is by means of an upwardly extending arm 19 which is rigidly secured to the side of the case or box by means of screws 20, or other suitable fas- 70 tening means, said arm 19 being provided at its upper end with a ring-like support, as 21, with which the upwardly extending end-portion of the elbow or arm-section 9 is operatively connected, and in such a manner 75 that the small tubular end of an amplifying horn can be connected therewith substantially in the manner represented in Fig. 1 of the drawings. Connected with said arm 19 is a finger 22 formed with a supporting 80 member 23 which is provided with a screw-threaded hole 24, and into which is screwed the screw-threaded shank-portion 26 of a pin or screw 25. The said screw 25 is used for rigidly securing upon said supporting 85 member 23 a suitably formed block, as 27, formed in one side with a vertically extending slot or groove 28. Extending from the same side of said block, and in alinement with said slot or groove 28, is another screw 90 or pin 29 which is provided with a head 30 arranged in a socket 31 with which the member or part 32 of a second and upwardly extending supporting arm 33 is provided. A 95 spring 34 which encircles the said screw or pin 29, and is arranged in said socket 31, is of such stiffness that the said parts are oscillatorily connected, so as to move in vertical planes with relation to each other, the spring holding said parts in any one of their 100 raised and adjusted relations, but the block 27 being still capable of rotation upon the pin or screw 25, so as not to interfere with the swinging movements of the arm-sections 7 and 8 with relation to the fixed position 105 of the arm-section 9, as will be clearly evident. The said arm 33 has a supporting portion 35 upon which the arm-section 7 rests, substantially in the manner shown. To provide for the proper position of the 110 sound box 11, relatively to the record-disk, the member or part 32 of the arm 33 is preferably made with a rib or projection, as 36, which normally registers with said slot or groove 28, as shown in Figs. 5 and 8, so as 115 to act as a stop to prevent any downward movement of the parts in the direction of the arrow *y*, see Fig. 5; but, the said rib or projection 36 readily rides out of said slot or groove 28, when the arm 33 and the parts 120 supported thereon are raised, as clearly represented in Figs. 6 and 9 of the drawings.

With the arrangement of the several devices and parts, as in Fig. 3 of the drawings, two arms, as 37 and 38 are provided, 125 said arms being respectively secured to and connected with the said rings or bands 15 and 16, at their upper end-portions, the



lower portions of said arms 37 and 38 being pivotally and oscillatorily connected by the same parts in the manner herein-above described and illustrated in said Figs. 5 to 9 inclusive of the drawings.

The operations and workings of the accordion-plaited tone-arm with relation to the fixed position of the amplifying horn are self-evident from the foregoing description, and from an inspection of the several figures of the drawings, and need, therefore, not be further described.

I am aware that some changes may be made in the general arrangements and combinations of the several devices and parts without departing from the scope of the present invention, as set forth in the foregoing specification and as defined in the claims which are appended thereto. Hence I do not limit my invention to the exact arrangements and combinations of the several devices and parts as described in the said specification, nor do I confine myself to the exact details of the construction of the said parts, as illustrated in the accompanying drawings.

I claim:—

1. A tone-arm comprising a series of rigid metallic sections, and an intermediate non-metallic flexible section, said section being accordion-plaited, so as to open and close in the direction of its longitudinal axis and also to curve to either side of said axis.

2. A tone-arm comprising a series of rigid metallic sections, and an intermediate non-metallic flexible section, said section being accordion-plaited, so as to open and close in the direction of its longitudinal axis and also to curve to either side of said axis, combined with means for supporting said tone-arm on the case of a talking machine or phonograph.

3. A tone-arm comprising a rigidly secured metallic arm-section upon which is mounted in a fixed position an amplifying horn, a second non-metallic flexible arm-section connected with said first-mentioned arm-section, said non-metallic arm-section being accordion-plaited, so as to open and close in the direction of its longitudinal axis and also to curve to either side of said axis, and a third rigid metallic arm-section connected with said flexible non-metallic section, said last-mentioned metallic arm-section having mounted thereon a sound-box.

4. A tone-arm comprising a rigidly secured metallic arm-section upon which is mounted in a fixed position an amplifying horn, a second non-metallic flexible arm-section connected with said first-mentioned arm-section, said non-metallic arm-section being accordion-plaited, so as to open and close in the direction of its longitudinal

axis and also to curve to either side of said axis, and a third rigid metallic arm-section connected with said flexible non-metallic section, said last-mentioned metallic arm-section having mounted thereon a sound-box, combined with means for supporting said tone-arm on the case of a talking machine or phonograph.

5. The combination with the case or box of a talking machine or phonograph, of an arm secured to said case or box, a finger connected with said arm, a supporting member connected with said finger, a pin extending from said supporting member, a swivel-block mounted upon said pin, said block being formed in one side with a groove, a pin extending laterally from said block and in alinement with said groove, said pin being provided with a head, an upwardly extending supporting arm provided with a socketed member in which the head of said last-mentioned pin is arranged, and a coiled spring within said socketed-portion, said spring encircling a portion of said last-mentioned pin, and a tone-arm carried by said arms, said tone-arm comprising a series of connected arm-sections, one of said sections being made of a flexible material.

6. The combination with the case or box of a talking machine or phonograph, of an arm secured to said case or box, a finger connected with said arm, a supporting member connected with said finger, a pin extending from said supporting member, a swivel-block mounted upon said pin, said block being formed in one side with a groove, a pin extending laterally from said block and in alinement with said groove, said pin being provided with a head, an upwardly extending supporting arm provided with a socketed member in which the head of said last-mentioned pin is arranged, and a coiled spring within said socketed portion, said spring encircling a portion of said last-mentioned pin, and a tone-arm carried by said arms, said tone-arm comprising a series of arm-sections, one of said sections being accordion-plaited or made in the form of a bellows.

7. The combination with the case or box of a talking machine or phonograph, of an arm secured to said case or box, a finger connected with said arm, a supporting member connected with said finger, a pin extending from said supporting member, a swivel-block mounted upon said pin, said block being formed in one side with a groove, a pin extending laterally from said block and in alinement with said groove, said pin being provided with a head, an upwardly extending supporting arm provided with a socketed member in which the head of said last-mentioned pin is arranged, and a coiled spring within said socketed portion, said

spring encircling a portion of said last-men-  
tioned pin, and a tone-arm carried by said  
arms, said tone-arm comprising a series of  
metal arm-sections, and an intermediately  
5 disposed arm-section made of a flexible fab-  
ric, said flexible fabric arm-section being ac-  
cordion-plaited or made in the form of a  
bellows.

In testimony, that I claim the invention  
set forth above I have hereunto set my 10  
hand this 28th day of October, 1911.

EDMUND PELTOVITZ.

Witnesses:

FREDK. C. FRAENTZEL,

FREDK. H. W. FRAENTZEL.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."



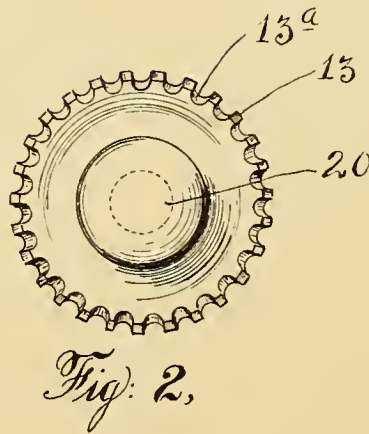
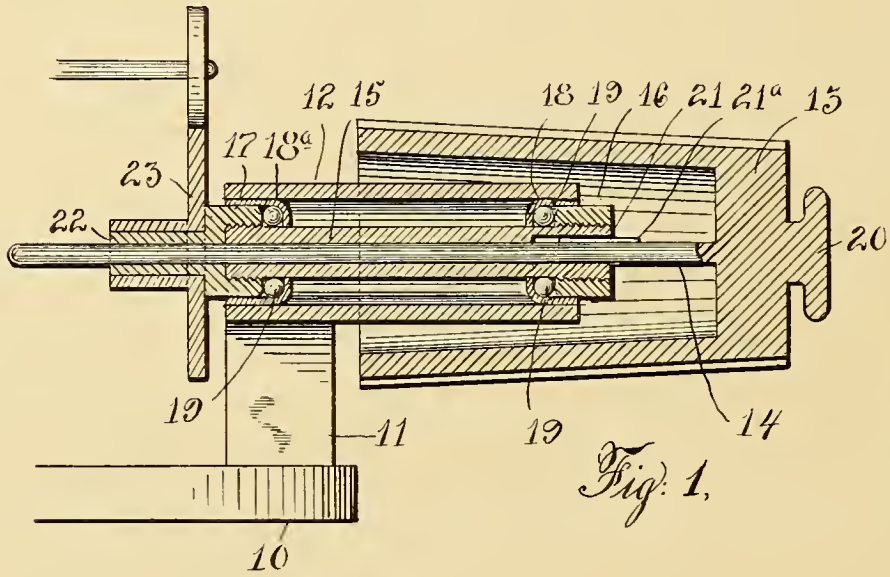


J. ROEVER.  
RECORD HOLDER.

APPLICATION FILED JULY 22, 1910. RENEWED SEPT. 20, 1913.

1,094,476.

Patented Apr. 28, 1914.



Witnesses:  
Arthur G. Dannel,  
Thomas T. Selye

Julius Roever, Inventor,  
By his Attorney,  
W. P. Hutchinson,

# UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y.

RECORD-HOLDER.

1,094,476.

Specification of Letters Patent.

Patented Apr. 28, 1914.

Application filed July 22, 1910, Serial No. 573,157. Renewed September 20, 1913. Serial No. 790,931.

*To all whom it may concern:*

Be it known that I, JULIUS ROEVER, of the city of New York, county of Queens, and State of New York, have invented a new and useful Improvement in Record-Holders, of which the following is a full, clear, and exact description.

My invention relates to improvements in record holders for phonograph records and especially to that class of holders which are mounted on a wheel or other rotary device, so that the records can be brought into successive operation. In record holders of this kind it has been found difficult to get a structure which would permit of a record being easily slipped on or off the holder, and at the same time permit of the record being easily adjusted so that the needle of the reproducer will strike exactly in the right point of the record.

The object of my invention is to produce a record holder which will permit a record to be instantly slipped on endwise over the holder without the necessity of operating or adjusting any mechanism, and in which the record can then be accurately adjusted in relation to the stylus of the reproducer.

A further object of my invention is to produce a holder which is cheap to manufacture and simple in construction, and one in which the friction of rotation is reduced to a minimum.

Other objects of my invention are to produce a record holder upon which a record can be easily placed or removed, and on which the ends of the record are left entirely free so that there is no danger of breaking them, and nothing to interfere with their adjustment, and further to produce a record holder which can not only be adjusted in and out on its supports, but has a central driving spindle extending through the support, and which can be entirely removed when necessary.

Another important feature of the invention is this: Phonograph records are of two general kinds, known in the trade as "wax records" and "indestructible records". The indestructible records can be carried on a skeleton holder, but the wax records cannot, because they are likely to collapse. Moreover, on record holders having a solid face, the wax records in either very warm or very cold weather are likely to stick so

that they break in taking them off. I provide my record holder, however, with longitudinal corrugations so that it presents a good gripping surface to the inner wall of the cylinder, but will not stick closely to the wax record, and so such records can be easily placed on or taken off the record holder, while the holder is also as well adapted to securing a so-called indestructible record.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a longitudinal section of a record holder embodying my invention, and Fig. 2 is an end view of the holder proper.

The means for carrying the record holder is immaterial and forms no part of this invention. I have, however, illustrated it as mounted on a horizontal disk 10. The record holder is supported by the post 11 which may be secured to the disk 10 or integral therewith. This post 11 terminates at its upper end in a horizontal casing 12. The record holder 13 is supported by the shaft or spindle 14 which is preferably integral therewith, and which extends through the sleeve 15, which sleeve is supported within the casing 12. The sleeve 15 is screw threaded at each end to receive the collars 16 and 17. These collars are beveled at their inner ends and when screwed onto the ends of the sleeve 15, form cones for ball bearings. Bearing cups 18 and 18<sup>a</sup> are supported rigidly within the casing 12 and are adapted not to contact with the sleeve 15, these cups 18 and 18<sup>a</sup> together with the cones 16 and 17, forming bearings for the balls 19.

The record holder proper 13 is in the form of a shell slightly larger in circumference at its inner end, and has its outer surface longitudinally corrugated as shown at 13<sup>a</sup> in Fig. 2, and is adapted to fit snugly against the inner surface of a phonographic record. The shell 13 is closed at its outer end, and has for convenience a handle 20 by which the holder 13 and the shaft 14 may be adjusted longitudinally in relation to the sleeve 15. The shaft 14 is movable longitudinally through the sleeve 15, but is turnable therewith, and to this end I pro-

vide a keyway 21 in the sleeve 15 and a key 21<sup>a</sup> upon the shaft 14. The collar 17 is elongated at its outer end forming a sleeve 22 upon which is mounted the friction disk 23 which is supported rigidly upon the sleeve 22 against the shoulder of the collar 17. The friction disk 23 may be rotated in any desired way. I have not shown means for rotating it, as such means form no part of the present invention. It is apparent, therefore, that when the friction disk 23 is rotated, the collar 17 together with the sleeve 15 and the shaft 14 will rotate with it within the casing 12 on the ball bearings provided therein. I thus provide a record holder which will rotate with a minimum of friction and also very smoothly and accurately, and on which the record may be adjusted very nicely in relation to the stylus of the reproducer.

It will be seen that one can grasp the handle 20 and not only adjust the record in and out on its support, but can pull the spindle or shaft 14 entirely out if desired, and if necessary to do any work on the record or other parts. This is often a great advantage.

I claim:—

1. A record holder comprising a horizontally arranged cylindrical casing, a sleeve held to rotate in the casing, a collar on the sleeve projecting from the end of the casing and carrying driving means, and a shell or mandrel open at its inner end and closed at its outer end, said shell or mandrel having a rigid internal spindle sliding freely in and removable from the aforesaid sleeve, but arranged to turn with the sleeve.

2. A record holder comprising a horizontally arranged casing, a sleeve turning in suitable bearings within the casing, means for driving the sleeve, and a shell or mandrel adapted to support a record, said shell or mandrel being open at one end, closed at the other, provided with a handle at its closed end, and having a rigid spindle arranged longitudinally within it, said spindle being freely movable in the aforesaid sleeve and detachable therefrom, and also arranged to turn with the sleeve.

JULIUS ROEVER.

Witnesses:

THOMAS T. SEELYE,  
ARTHUR G. DANNELL.

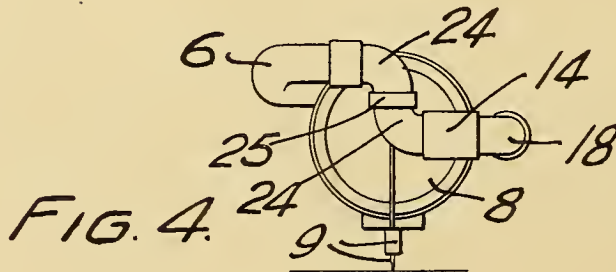
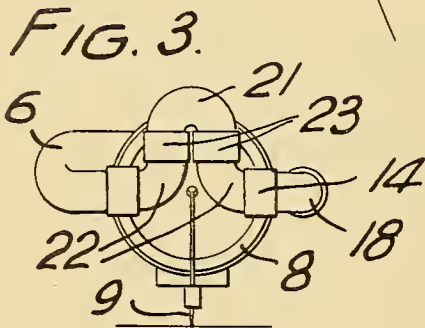
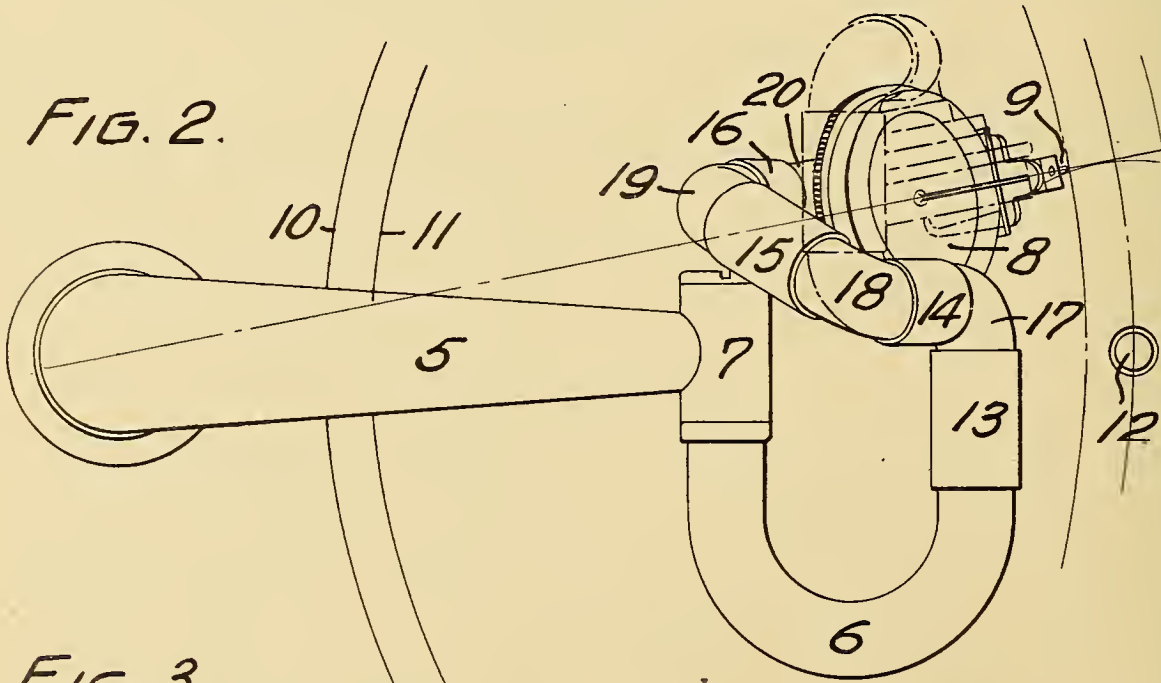
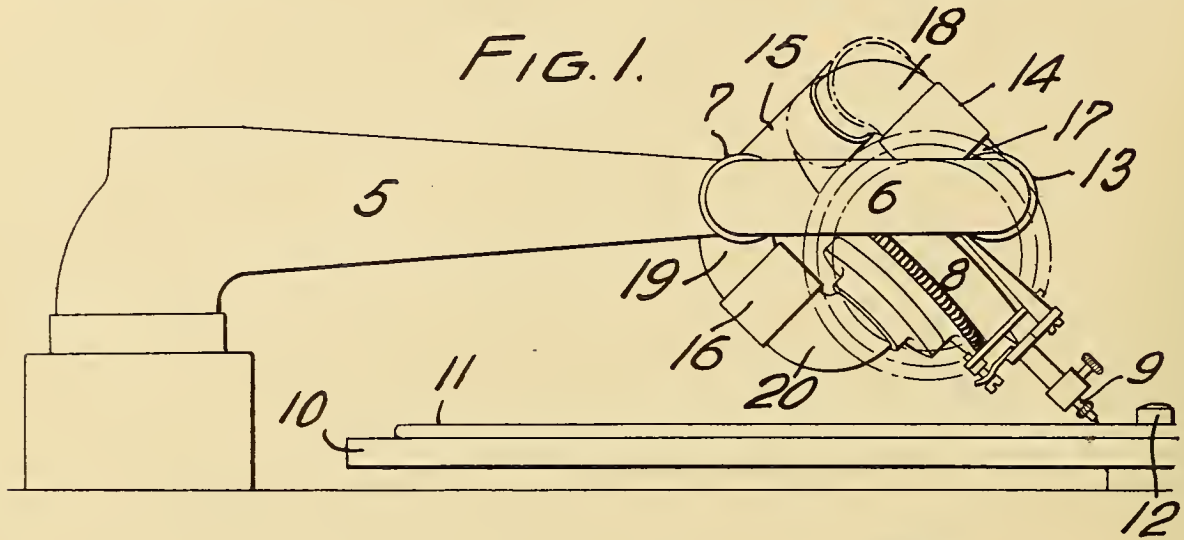




S. DAYAN.  
ATTACHMENT FOR SOUND REPRODUCING INSTRUMENTS.  
APPLICATION FILED MAR. 21, 1913.

1,095,195.

Patented May 5, 1914.



Witnesses  
*Stuart R. Waller*  
*G. M. Moreland*

Inventor  
Sylvain Dayan  
By *J. B. Fetherstonhaugh*  
His Attorney.

# UNITED STATES PATENT OFFICE.

SYLVAIN DAYAN, OF MONTREAL, QUEBEC, CANADA.

ATTACHMENT FOR SOUND-REPRODUCING INSTRUMENTS.

1,095,195.

Specification of Letters Patent.

Patented May 5, 1914.

Application filed March 21, 1913. Serial No. 755,952.

*To all whom it may concern:*

Be it known that I, SYLVAIN DAYAN, a subject of the King of Great Britain, residing at the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Attachments for Sound-Reproducing Instruments, of which the following is a full, clear, and exact description.

10 This invention relates to attachments for sound reproducing machines, and more particularly for gramophones of a type similar to the Victor.

15 The object of the invention is to provide a jointed tube adapted to be inserted between the sound box and goose neck, so that the sound box may be suitably adjusted to use either steel or sapphire needles.

20 A further object is to provide a device of this character which will not require to be removed each time a change is made from steel to sapphire needles.

25 There are several important recognized principles in connection with sound reproduction which must be thoroughly understood before the full importance of the present invention becomes apparent. First it must be understood that the disposing of the diaphragm or sound-box, whatever the character of the needles used is dependent upon the nature of the record-groove, whether vertically undulatory or laterally undulatory, that when using either steel or sapphire needles, the best results are obtained when the needles are arranged at an angle of approximately 45° to the record groove, that the arc of movement of the needle should pass through the axis of rotation of the record. In other words, a line drawn through the axis of rotation of the tone arm and the needle point should be at all times substantially tangent to the grooves of the sound record. The drag of the moving record on a properly placed needle has absolutely no tendency to move it either toward or away from the record center and therefore the needle presses equally against each side of the record-groove. If, however, the needle is placed on the opposite side of the record-axis from the tone arm axis, the needle will drag against the inner walls of the record-grooves and be uncertain in action. The pressure of the needle, however, upon the groove-walls when the needle

is located between the record and tone-arm axes is the same for the same distance from the axis, but in opposite direction.

This invention consists in providing a flexible tube made of relatively revoluble sections connected by elbows adapted to be permanently inserted between the goose neck and sound box, so that the sound box may be arranged in any position and the needle adjusted to any angle for playing with either steel or sapphire needles, and may be adjusted either inside or outside of the record center, so that the needle will press against one side or the other of the record grooves to overcome centrifugal force and to correct any skipping tendency.

70 In the drawings which illustrate the invention:—Figure 1 is a side elevation of the device in operative position showing in full lines the adjustment for using a sapphire needle, and in dotted lines the adjustment for using a steel needle. Fig. 2 is a plan view corresponding to Fig. 1. Figs. 3 and 4 are front elevations of slightly modified forms of the device.

Referring more particularly to the drawings, 5 designates the tone arm of a gramophone, 6 the goose neck connected thereto by the swivel joint 7, and 8 the sound box usually carried at the free end of the goose neck and provided with a needle 9. The record table is designated 10, and a record 11 is illustrated in position thereon and is held by the usual center-pin 12.

The device forming the subject matter of this invention consists of a flexible tube connecting the goose neck and sound box, this tube being made up of four sections 13, 14, 15 and 16 connected by elbows 17, 18, and 19 and having an elbow 20 for the attachment of the sound box. The straight section 13 is arranged to be secured to the free end of the goose neck as shown, while the remaining straight sections 14, 15 and 16 are made any suitable length according to the size of the sound box. Each of the elbows 17, 18, 19 and 20 turns through an angle of substantially 90°. The straight sections 14, 15 and 16 are in reality only swivel joints connecting the elbows so that the tube may be adjusted to a great variety of shapes, and the sound box adjusted to any angle in three planes.

In Figs. 3 and 4, slightly modified alterna-



tive forms are shown in which the parts 13 and 17 are replaced by other forms. In Fig. 3, a U-shaped tube is built up of a return bend 21 connected to two oppositely opening elbows 22 by swivel joints 23. In Fig. 4, a reversely curved tube is provided consisting of the oppositely directed elbows 24 connected by a swivel joint 25.

For playing records with sapphire needles, the sound box is arranged as shown in the drawings, preferably with the point of the needle slightly behind the record center, as shown in Fig. 2. The reason for this position is that most records made for sapphire needles start at the center and play outwardly. This position of the needle causes it to press outwardly against the groove walls, so that there is no tendency to cause the needle to skip from one groove to the next beyond. The preferred adjustment of the tubular connection is as shown with the part 13 horizontal, elbow 17 turned upwardly and rearwardly, swivel part 14 extending upwardly and rearwardly, elbow 18 extending downwardly and slightly away from the goose neck, swivel part 15 continuing in the same direction, elbow 19 extending downwardly, forwardly and very slightly away from the goose neck, part 16 continuing in this latter direction, and elbow 20 extending forwardly, upwardly and slightly away from the goose neck so as to hold the sound box at its proper inclination. To change from sapphire needle to steel needle, the tube is grasped with one hand at the part 13 and with the other about at the elbow 19, and the elbow 18 turned relatively to the elbow 17, so as to move the sound box through an angle of approximately 90°. The sound box is then turned relatively to the elbow 20 to bring the needle into proper angular relation with the record, and the change is complete. In this way it may be made almost instantly without detaching or adding any parts for playing the different styles of records. The forms shown in Figs. 3 and 4 permit of the same adjustment, the only difference being a slightly greater radius of adjustment owing

to the greater length of tube and additional number of joints.

From the foregoing description, it will be readily understood that the sound box may be adjusted to any position required to conform to any of the principles or laws laid down. In addition to this, the device may be used on different sizes of machines in which the tone arms are at varying distances above the record by making an adjustment between the part 13 and goose neck 6, which will have the effect of inclining the goose neck and raising or lowering the entire device.

While only three forms of the invention have been shown, it is obvious that a number of alterations in the precise arrangement may be made without departing from the spirit of the invention. Therefore it must be understood that nothing contained in this specification shall be regarded as limitative, but merely as illustrative.

Having thus described my invention, what I claim is:—

An attachment for gramophones having a goose neck and a sound box including a flexible tube intermediate the goose neck and the sound box, said tube comprising a straight horizontally arranged portion connecting the gramophone goose neck with an elbow, an upwardly and rearwardly extending straight portion connecting the other end of said elbow with one end of a downwardly inclined elbow, a downwardly inclined straight portion extending away from the goose neck connecting said last named elbow with a downwardly and forwardly inclined elbow, a forwardly and upwardly extending elbow connected to the sound box and a downwardly and forwardly inclined straight portion connecting said last two mentioned elbows, each of said elbows being 90 degree elbows.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

SYLVAIN DAYAN.

Witnesses:

STUART R. W. ALLEN.

G. M. MORELAND.



COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.



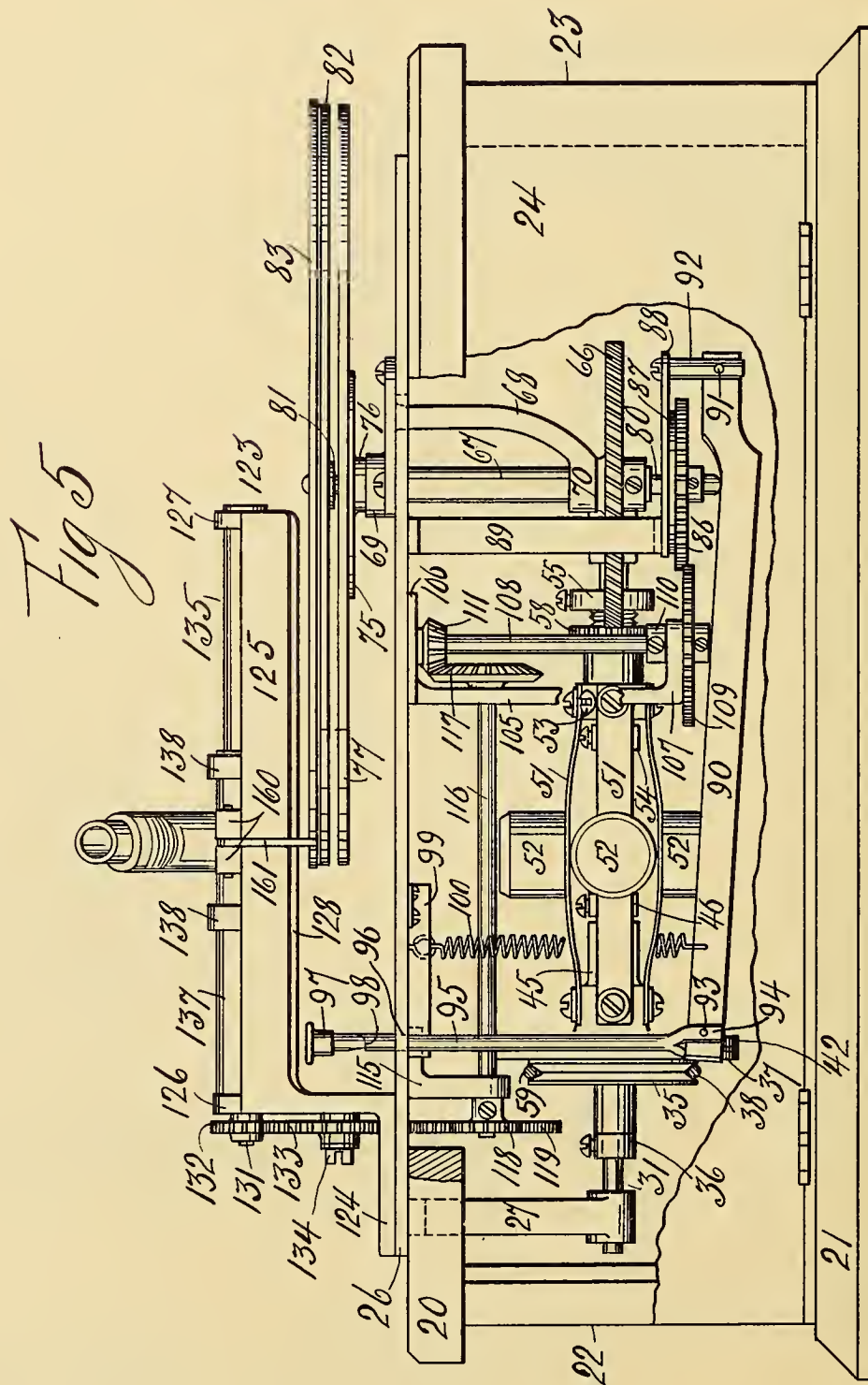


E. E. NORTON.  
TALKING MACHINE.  
APPLICATION FILED APR. 1, 1909.

1,095,225.

Patented May 5, 1914.

4 SHEETS-SHEET 2.



Witnesses  
Martin Zimansky.  
John Millie

Inventor  
Eugene Earl Norton  
By his Attorney  
Atde Bonnevillie

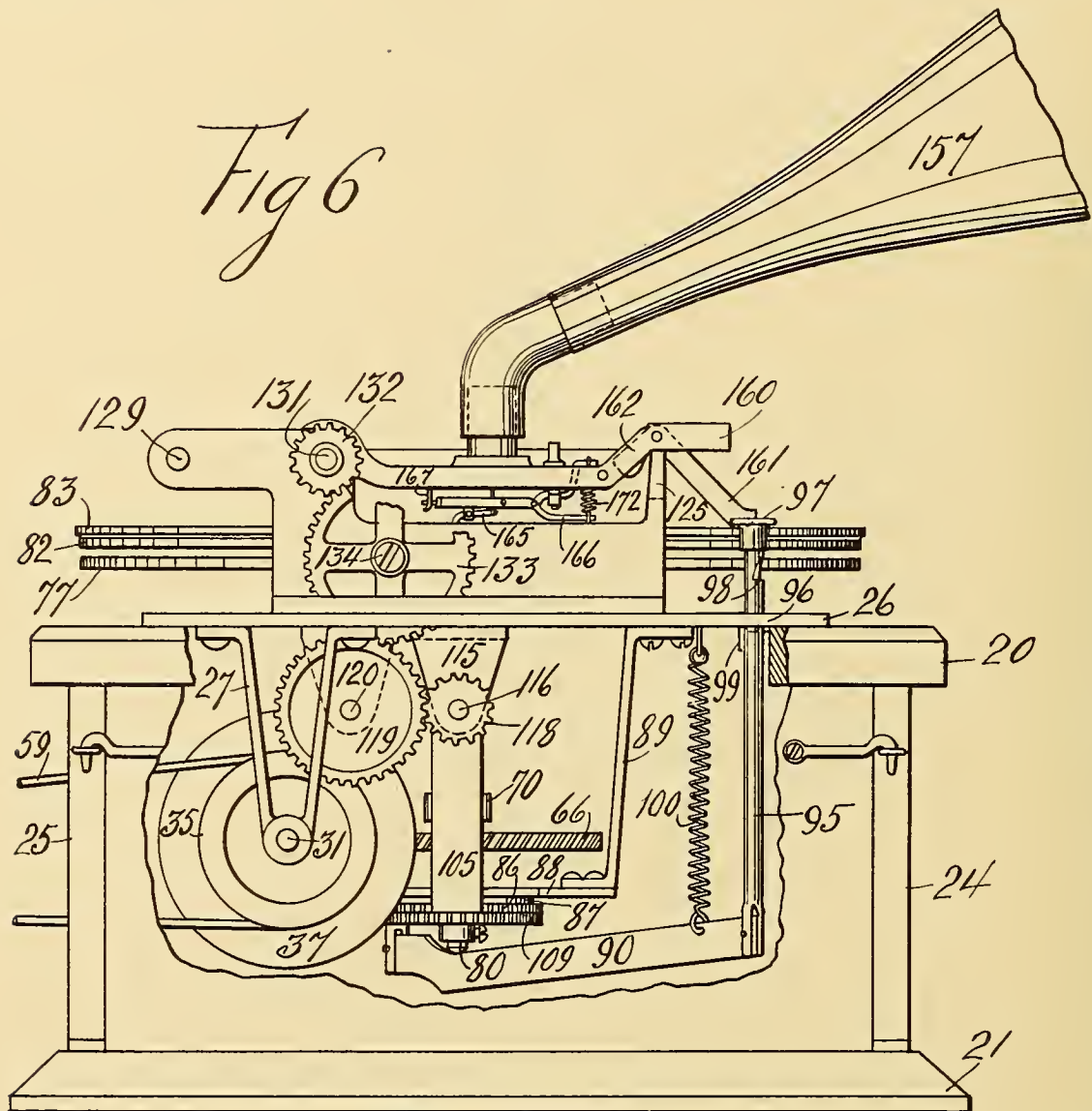




1,095,225.

Patented May 5, 1914.

4 SHEETS—SHEET 3.



Witnesses  
Martin Zimansky.  
John Millin

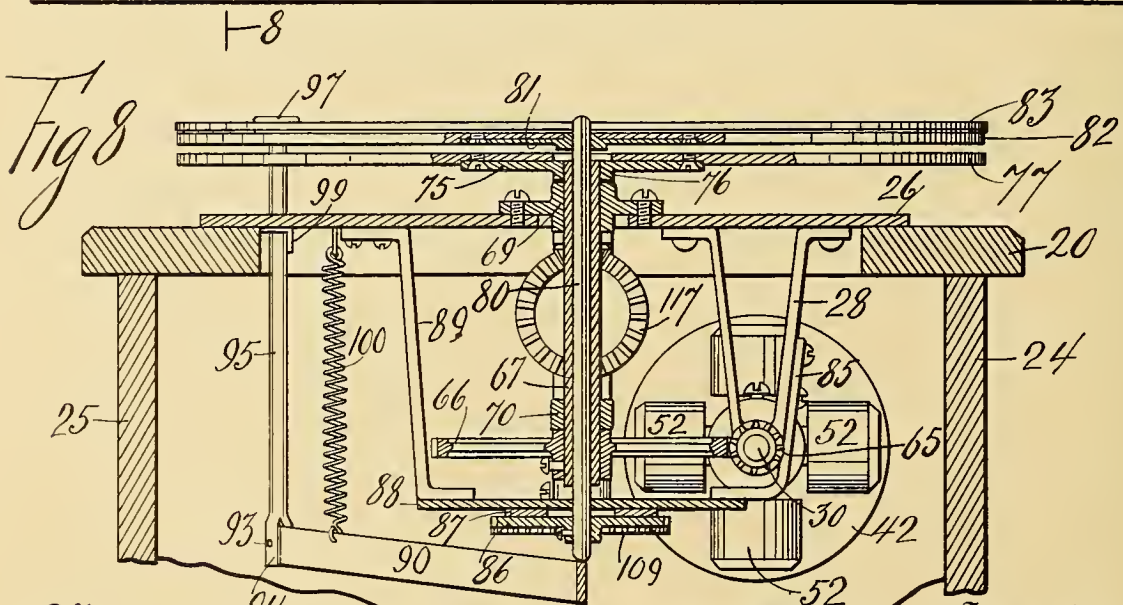
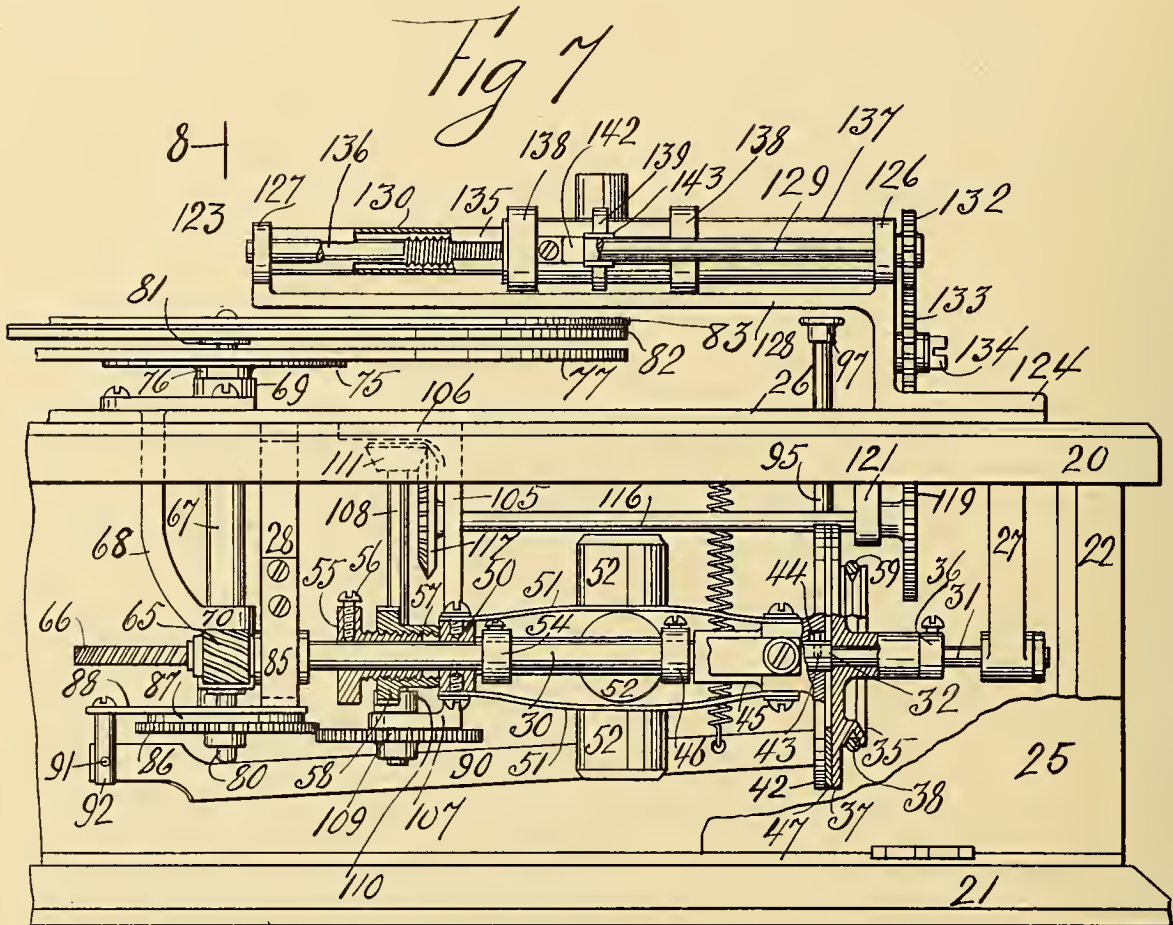
Inventor  
Eugene Earl Norton  
By his Attorney  
Art du Bonville



1,095,225.

Patented May 5, 1914.

4 SHEETS—SHEET 4.



Witnesses  
Martin Zimansky.  
John J. Miller

Inventor  
Eugene Earl Norton  
By his Attorney  
W. D. Pomville



# UNITED STATES PATENT OFFICE.

EUGENE EARL NORTON, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO JAMES ALBERT WHITMAN, OF NEW YORK, N. Y.

## TALKING-MACHINE.

1,095,225.

Specification of Letters Patent.

Patented May 5, 1914.

Application filed April 1, 1909. Serial No. 487,334.

*To all whom it may concern:*

Be it known that I, EUGENE EARL NORTON, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and especially to propelling devices for the sound boxes thereof.

The invention is distinguished by a propelling device for disk records, having up and down cuts. The records are distinguished from the zig zag records where the variations are in horizontal planes, while the records for which this invention is applicable have surfaces inclined to horizontal planes. The sounds with this device are produced by the contact of the needle point with said inclined surfaces, and the mechanism of the invention propels the point across the horizontal plane of the records.

The invention also relates to means for rotating and instantly starting or stopping the disk carrying the disk record.

In the accompanying drawings, Figure 1 shows a top plan view of the invention, Fig. 2 represents an enlarged partial section of Fig. 1 on the line 2, 2, Fig. 3 is similar to Fig. 2 with some of the elements in a changed position, Fig. 4 is a partial section as on the line 4, 4 of Fig. 2, Fig. 5 is an enlarged right hand view of Fig. 1 with a portion of its case broken away, Fig. 6 shows a left hand view of Fig. 5, Fig. 7 represents a left hand view of Fig. 6 with the case broken away, and Fig. 8 shows a section of Fig. 7 on the line 8, 8.

The talking machine is represented with a casing comprising the top 20, bottom 21, side walls 22, 23, hinged front door 24 and hinged rear door 25. A frame plate 26 is fastened to the top 20 of the casing, and from which extend into said casing the journal brackets 27, 28. A governor with its driven shaft comprising the portions 30 and 31, shouldered at 32 is journaled in said brackets 27, 28. A driving pulley 35 is journaled on the portion 31 of the said shaft with one end thereof laterally bearing

end against a collar 36 fastened to the portion 31. The said pulley has formed therewith a friction disk 37 and the V groove 38. An accompanying sleeve friction disk 42 is longitudinally supported on the portion 30 of said driving shaft. A pin 43 extends from the portion 30 and engages a cavity 44 in the said disk 42. The sleeve 45 of the disk 42 extends to within a short distance of an adjustable collar 46 on the portion 30. An annular disk 47 preferably of fiber is fastened to the face of the disk 42.

An adjustable collar 50 is carried on the portion 30 and flexible bands 51 having the weights 52 connect it with the sleeve 45. A screw 53 can secure the adjustable collar 50 to the portion 30 in different positions. An adjustable collar 54 is located on the portion 30 within a short distance of the collar 50. A threaded stop sleeve 55 is fastened to the portion 30 by means of the screw 56, and is in threaded engagement with the adjustable stop 57 having the knurled flange 58. A belt 59 connects the pulley 35 with the pulley 60 of the electric motor 61.

On the portion 30 of the driving shaft and bearing against the outside face of the journal bracket 28 is fastened the spiral gear 65, the teeth of which mesh with the teeth of the spiral gear 66 fastened to the sleeve 67.

From the frame plate 26 extends the journal bracket 68 with the upper bearing 69 and the lower bearing 70, and the sleeve 67 is journaled in said bearings. At the upper end of the sleeve 67 is fastened the disk 75, the lower edge of the hub 76 of which bears on the upper edge of the bearing 69. A friction disk 77 is carried and fastened to the disk 75. A spindle 80 is located within the sleeve 67. A disk 81 is fastened to the spindle 80 which carries the friction disk 82, and on the upper face of the latter is secured a cloth cover in the usual way for the disk record 83. The lower face of the disk 82 with the upper face of the disk 77 constitutes a record friction clutch or brake. A spur gear 86 is fastened to the spindle 80 and carries on its upper face the annular friction ring 87, which latter is in the path of the stationary friction plate 88 carried on the brackets 89 and 85, extending respec-



tively from the plate 26 and the bracket 28. The lower end of the spindle 80 is adjustably carried on the lever 90. The said lever 90 is fulcrumed on a pin 91 fastened to the  
 5 bifurcated lug 92 extending from friction plate 88. The swinging end of the lever 90 is pinned, by means of the pin 93 in the forked end 94 of the adjusting rod 95. The latter is guided through an opening 96 in  
 10 the frame plate 26 and has formed at its upper end the cap 97. The rod 95 is notched to form a stop 98 that can engage with the lower face of the frame plate 26. A spring  
 15 99 is fastened to the lower face of the frame plate 26 and bears against the upper end of the adjusting rod 95, to maintain the stop 98 in engagement with the plate 26 when so  
 located by the operator. A spring 100 extends between the plate 26 and the lever 90  
 20 to cause the said lever to bear up against the spindle 80, to separate the friction disk 82 from the friction disk 77.

A bracket 105 is fastened to the frame plate 26 and has formed therewith the upper  
 25 leg 106 and the lower leg 107. A vertical shaft 108 is journaled in said legs and has fastened to its lower end the spur gear 109, the teeth of which mesh with the teeth of the spur gear 86 on the spindle 80. A  
 30 collar 110 on the vertical shaft 108 prevents the longitudinal displacement of the latter, and a bevel pinion 111 is carried on the upper end of said vertical shaft 108. A journal bracket 115 extends from the plate  
 35 26, and a horizontal shaft 116 has one end journaled in the bracket 105 and the other end in the bracket 115. A bevel gear 117 on the shaft 116 gears with the bevel gear 111. A pinion 118 is carried on the shaft 116 and  
 40 its teeth mesh with the teeth of a spur gear 119 journaled on a pin 120 fastened to the bracket 121 extending from the frame plate 26.

On top of the frame plate 26 is supported  
 45 the U shaped frame 123 with the foot 124, front wall 125, side walls 126, 127, tie bar 128 and guide rod 129. A screw 130 has one of its cylindrical ends 131 journaled in a collar 175 carried in the sleeve 135 and the  
 50 other end in a plug 176 secured in the other end of said sleeve. A pinion 132 is fastened to one of the ends 131 and its teeth mesh with the teeth of a spur gear 133 journaled on a pin 134 extending from the wall 126.  
 55 The teeth of the gear 133 mesh with the teeth of the gear 119. A sleeve 135 with a longitudinal slot 136 surrounds the screw 130. An outer sleeve 137 is slidably supported on the sleeve 135. The outer sleeve  
 60 137 carries the ring supports 138, and the ring support 139 having the notch 140 of the sound box frame 141.

A supporting bracket 142 with the forked arm 143 and legs 144 is fastened to the outer

sleeve 137 by means of the screws 145, the  
 65 legs 144 bearing against the ring supports 138. The forked arm 143 straddles the guide rod 129. A cavity in the arm 143 supports the spring 146, which bears against a spindle 147, guided in said arm and extending from  
 70 an engaging bracket 150 with the threaded legs 148, which gage with the threads of the screw 130. A wall 149 somewhat beveled of said engaging bracket is located in the path  
 75 of the notch 140 of the ring support 139 to disengage the threaded legs 148 from the screw 130.

The sound box frame 141 carries the housing 155 of the sound box having the diaphragm 156, horn 157, and needle point  
 80 158. The needle point 158 is carried by a spring reproducer comprising a lever 165 pivoted to the spring lever 166, one end of which latter is guided in a ring 167 in the usual way. The lever 165 is pivoted to the  
 85 link 168 that connects with the diaphragm 156. The spring lever 166 is pivoted to the oscillating arm 169, having the upper pin 170 and lower pin 171 in the usual way, and a spring 172 extends between the end  
 90 of the arm 169 and the accompanying end of the spring lever 166. A bifurcated leg 160 extends from the frame 141 and which can bear on the front wall 125 of the U  
 95 shaped frame 123. An operating lever with the legs 161 and 162 is pivoted in the leg 160. The leg 162 can be made to bear on the top edge of the front wall 125 by raising the leg 161, by virtue of which the needle  
 100 point 158 is brought out of the path of the disk record 83.

To operate the invention, the disk record 83 having been located on the friction disk 82, the motor 61 is started to impart rotation to the pulley 35. The friction disks 37  
 105 and 42 transmit rotation to the portion 30 of the driving shaft of the governor. The said governor is fully described in my patent applications filed October 13, 1908, Serial Number 457,469 and December 9, 1908,  
 110 Serial Number 466,627.

The spiral gear 65 rotates with portion 30 of the driving shaft and turns the spiral gear 66 on the sleeve 67, by virtue of which the friction disk 77 is turned. The opera-  
 115 tor next bears down on the cap 97 of the adjusting rod 95 to cause the stop 98 to lock with frame plate 26, and thereby the lever 90 in swinging down on the pin 91, carries with it the spindle 80. When the spindle  
 120 80 is lowered it carries with it the friction disk 82, to make contact with the friction disk 77, and thereby rotation is transmitted from the disk 77 to the disk 82 and its spindle 80. With the lowering of the spindle  
 125 80 the friction disk 87 is disengaged from the stationary plate 88 releasing the said spindle 80. The spindle 80 through the



gears 86 and 109 transmits rotation to the vertical shaft 108. The bevel pinion 111 on the shaft 108 transmits rotation to the horizontal shaft 116 through the bevel gear 117. Rotation from the shaft 116 is transmitted to the screw 130 by means of the interposed gearing.

The screw 130 rotating, and the leg 162 of the operating lever being located on the top edge of the front wall 125 of the U shaped frame 123, the needle point 158 is maintained out of the path of the disk record 83. The threaded legs 148 are also maintained out of engagement with the said screw 130, as shown in Fig. 3, by reason of the wall 149 of the bracket having the legs 148 bearing against the ring support 139.

Next the operator disengages the leg 162 of the operating lever from the front wall 125 and the needle point 158 contacts with the grooves of the record 83, the notch 140 of the ring support 139 allowing the spring 146 to push forward the bracket 150, so that its threaded legs 148 engage with the screw 130, by virtue of which the sound box with its appurtenances is driven in a straight line over the disk record.

To stop the talking machine for the purpose of inserting a new disk record, the operator, disengages the stop 98 of the rod 95 from the frame plate 26. The lever 90 is then raised by the tension of the spring 100 and causes the spindle 80 to rise, by virtue of which the friction disk 87 comes in the path of the stationary plate 88, which stops the spindle 80 carrying the record 83, and also disengages the friction disks 77 and 82, the latter carrying the disk record. The elements 87 and 88 constitute a brake for the spindle 80. It will be noted that the friction disk 77 continues turning while the motor 61 is in operation, and that the friction disk 77 transmits motion to the friction disk 82, and that full speed is given to the disk 82 as soon as contact is made between it and the said disk 77.

Having described my invention what I desire to secure by Letters Patent and claim is:

1. In a talking machine the combination of a governor, a shaft for said governor, means to rotate said shaft through the intervention of the governor, a sleeve, connections between the said sleeve and said shaft, a friction disk connected to said sleeve, a spindle within the sleeve, a second friction disk for a disk record connected to said spindle located so that it can bear against the first friction disk, and means to bring the friction disks in contact with each other.

2. In a talking machine the combination of a governor, a shaft for said governor, means to rotate said shaft through the intervention of the governor, a sleeve, connec-

tions between the said sleeve and said shaft, a friction disk connected to said sleeve, a spindle within the sleeve, a second friction disk for a disk record connected to said spindle located so that it can bear against the first friction disk, a brake connected up with the spindle, and means to bring the friction disks in contact with each other.

3. In a talking machine the combination of a rotative sleeve, a friction disk connected with said sleeve, a spindle within the sleeve, a second friction disk for a disk record connected to said spindle, a lever bearing up against said spindle, means to move the lever to bring the friction disks in contact with each other.

4. In a talking machine the combination of a rotative sleeve, a friction disk connected to the sleeve, a spindle within the sleeve, a second friction disk for a disk record connected to the spindle, a lever in the path of the lower end of said spindle, an adjusting rod for the lever and a friction ring connected up with the spindle in the path of a friction plate.

5. In a talking machine the combination of a rotative sleeve, a friction disk connected to the sleeve, a spindle within the sleeve, a second friction disk for a disk record connected to the spindle, a lever in the path of the lower end of said spindle, an adjusting rod for the lever, a friction ring connected up with the spindle in the path of a friction plate, a screw journaled in the machine, a sound box for the machine, means between the screw and sound box to propel the latter and gearing interposed between the said spindle and said screw to rotate the latter.

6. In a talking machine the combination of a governor, a driven shaft of the governor maintained at a uniform speed of rotation, a gear on said shaft, a sleeve journaled in the machine, a gear on the sleeve with its teeth meshing with the teeth of the gear on the driven shaft, a friction disk connected with the sleeve, a spindle within the sleeve, a friction disk connected with the spindle, adapted to carry a disk record, a brake connected with the spindle, a second gear on the spindle, a screw with its ends journaled in the machine, connections between said screw and the second gear on said spindle, a sound box in adjustable engagement with said screw, a needle point connected with the sound box in the path of the disk record, a lever bearing up against the lower end of said spindle pivoted in the machine to vertically move the spindle to actuate and move the friction disk of the spindle relatively to the friction disk of said sleeve.

7. In a talking machine the combination of a rotative sleeve, a friction disk connected to the sleeve, a spindle within the sleeve, a



second friction disk for a disk record connected to the spindle, the two friction disks constituting a clutch, and a second clutch connected to the spindle, one of the said  
5 clutches performing its function while the other is inoperative.

Signed at the borough of Manhattan in

the county of New York and State of New York this 29th day of March A. D. 1909.

ENGINE EARL NORTON.

Witnesses:

MARTIN ZIMANSKY,  
M. H. COOK.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

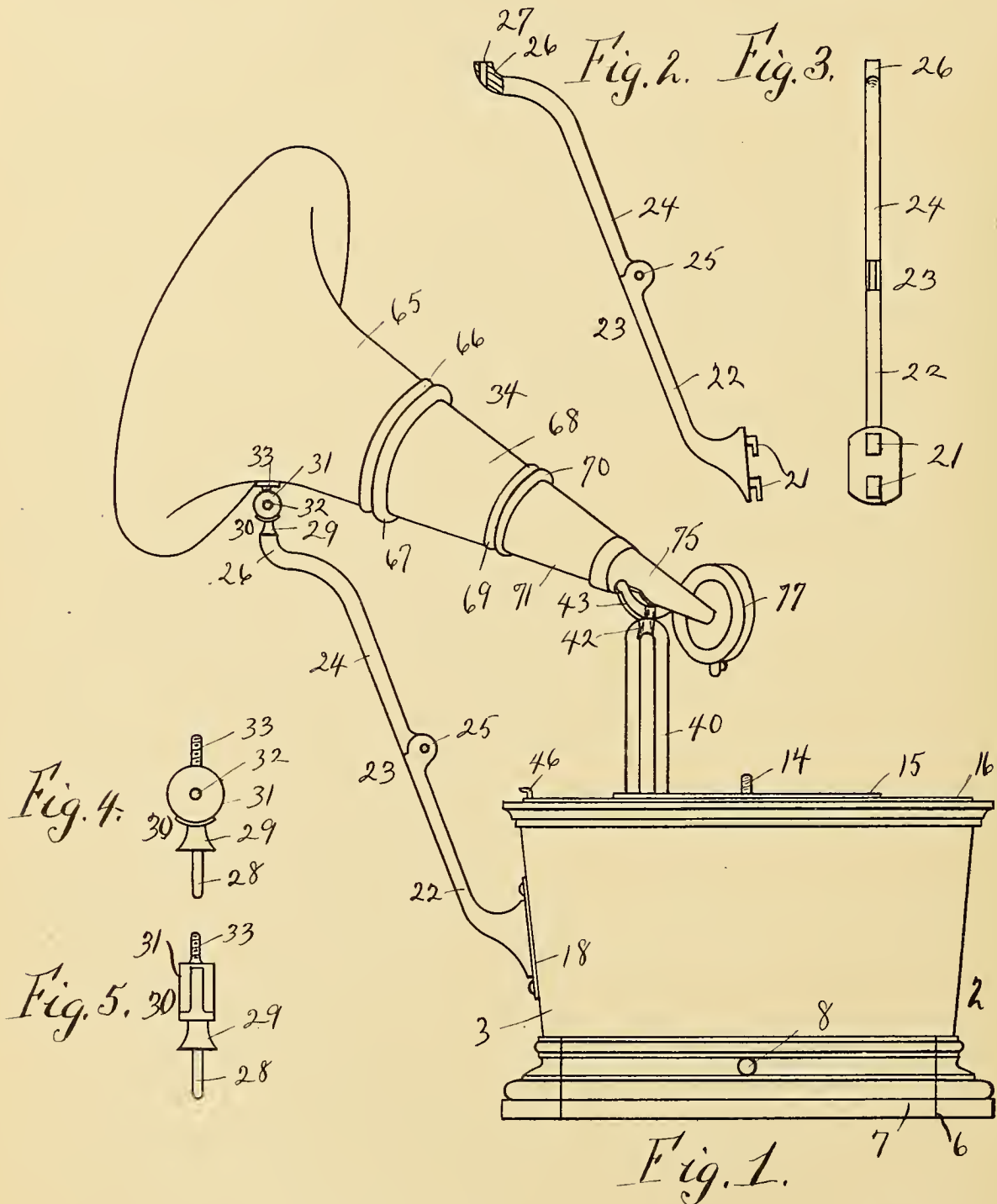


G. DI STANISLAO.  
TALKING MACHINE.  
APPLICATION FILED JUNE 24, 1912.

1,095,747.

Patented May 5, 1914.

4 SHEETS—SHEET 1.



Witnesses  
M. P. Williamson  
S. Williamson

Inventor  
Giuseppe di Stanislao  
By H. P. Williamson  
Attorney



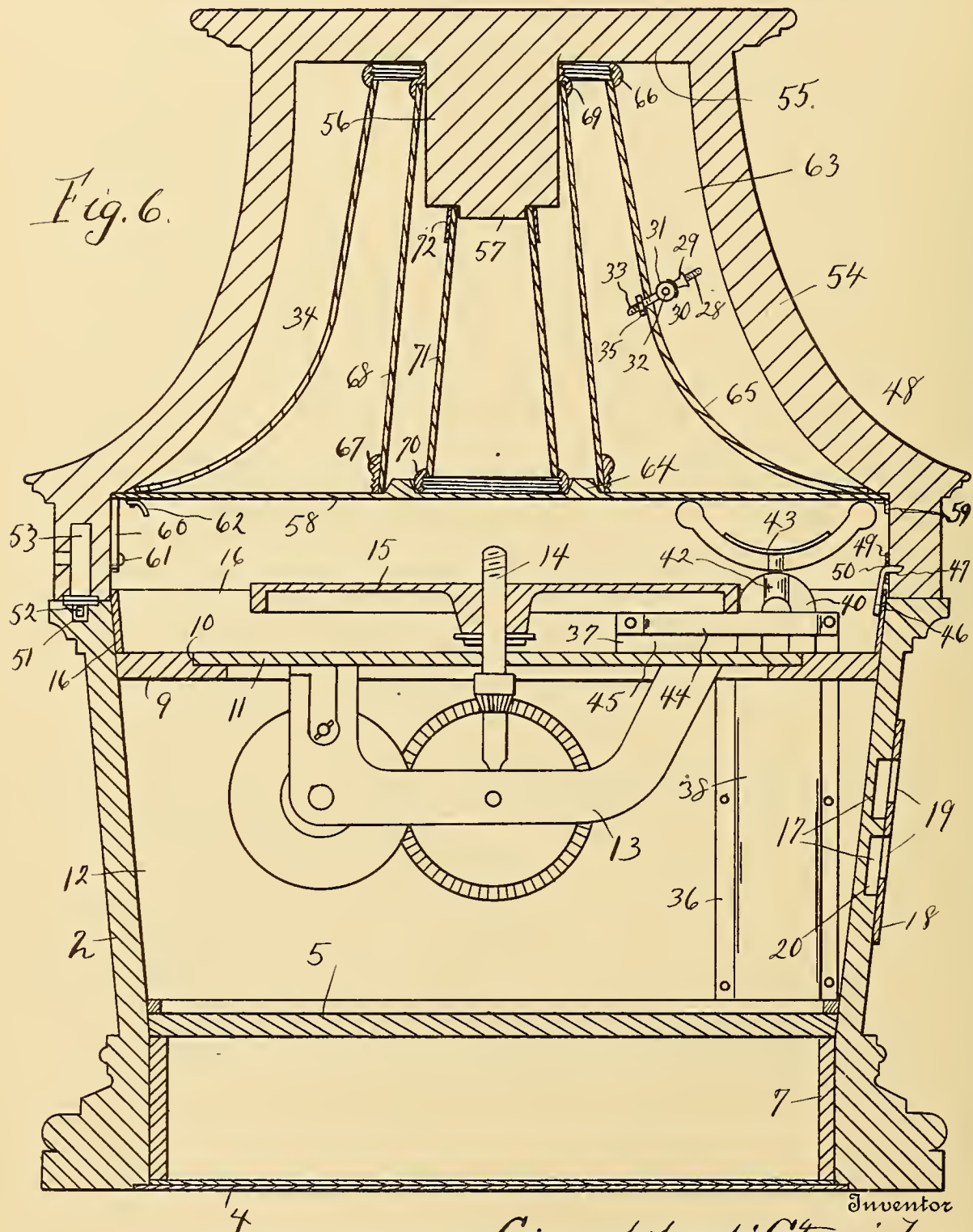


G. DI STANISLAO.  
TALKING MACHINE.  
APPLICATION FILED JUNE 24, 1912.

1,095,747.

Patented May 5, 1914.

4 SHEETS—SHEET 2.



Witnesses  
M. P. Williamson  
S. Williamson

*Giuseppe di Stanislao*

By *H. W. Williamson*  
Attorney

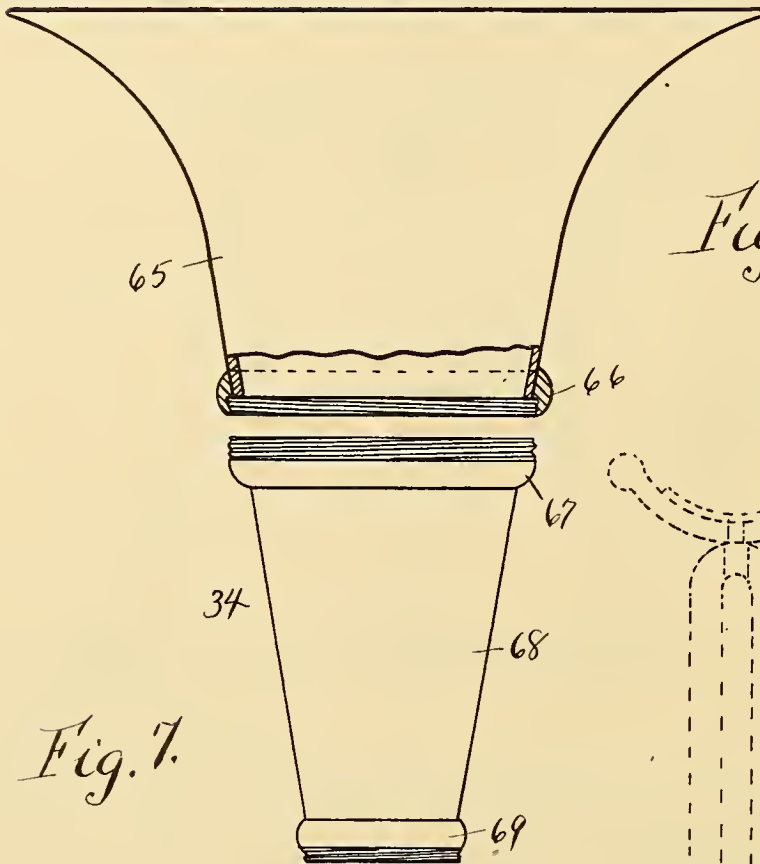




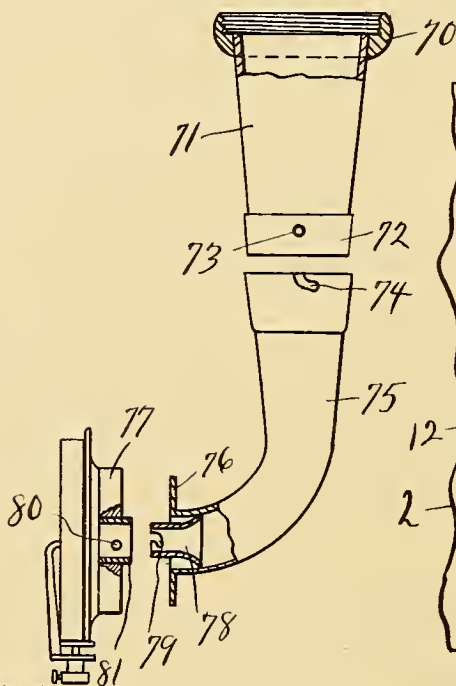
1,095,747.

Patented May 5, 1914.

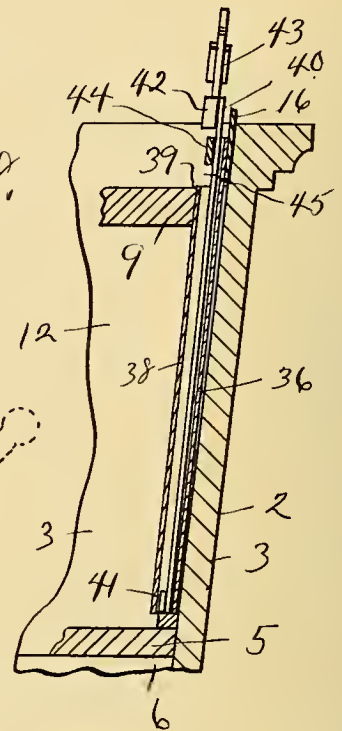
4 SHEETS—SHEET 3.



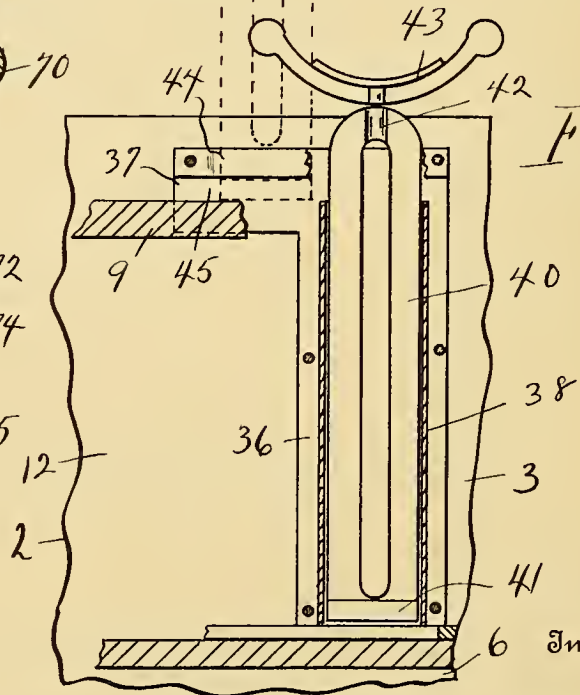
*Fig. 7.*



*Fig. 8.*



*Fig. 9.*



Witnesses

M. P. Williamson  
J. Williamson

Giuseppe di Stanislao  
By W. W. Williamson  
Attorney

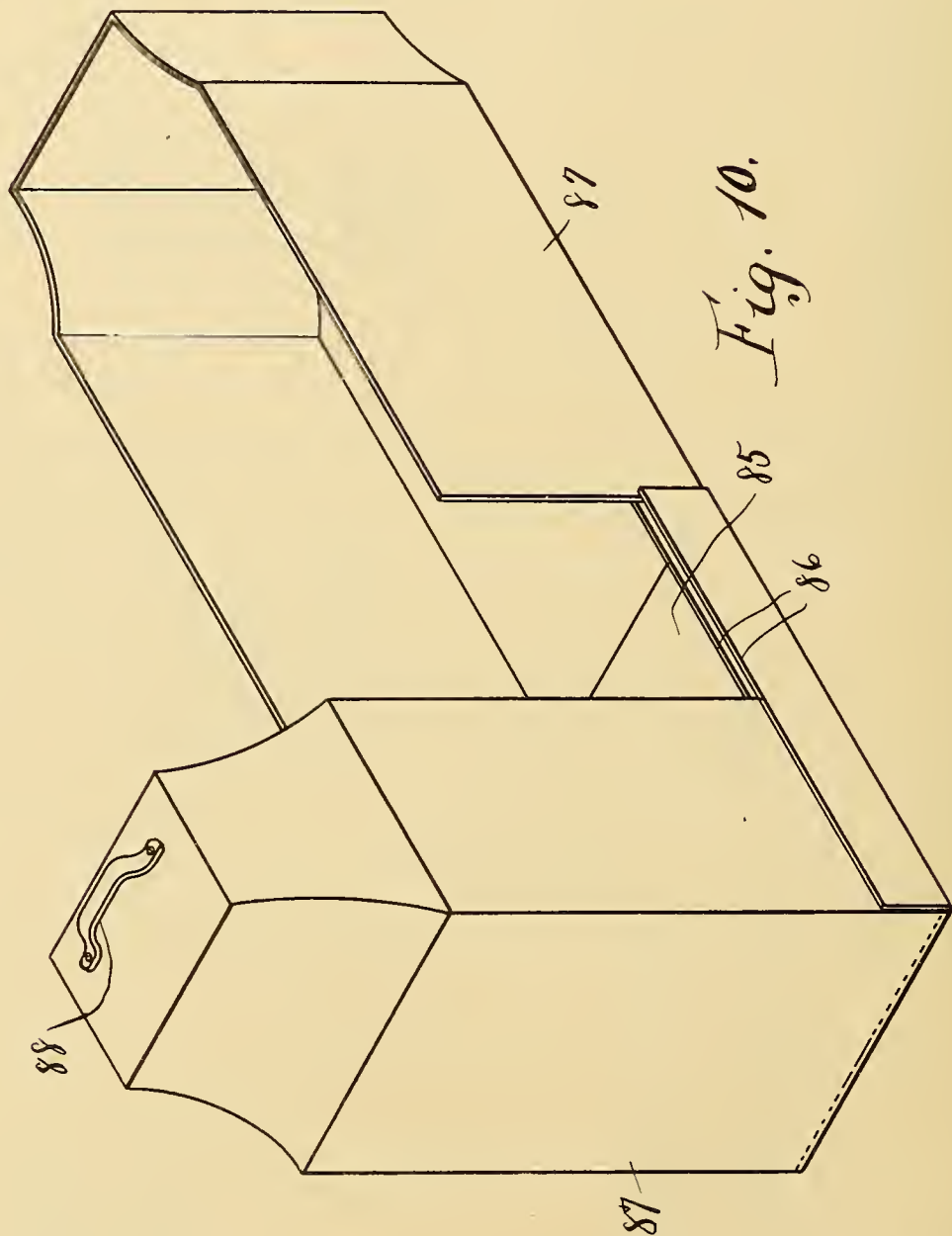


G. DI STANISLAO.  
TALKING MACHINE.  
APPLICATION FILED JUNE 24, 1912.

1,095,747.

Patented May 5, 1914.

4 SHEETS—SHEET 4.



Witnesses  
M. O. Williamson  
A. Williamson

Inventor  
Giuseppe di Stanislao  
By H. W. Williamson  
Attorney



# UNITED STATES PATENT OFFICE.

GIUSEPPE DI STANISLAO, OF CAMDEN, NEW JERSEY.

## TALKING-MACHINE.

1,095,747.

Specification of Letters Patent.

Patented May 5, 1914.

Application filed June 24, 1912. Serial No. 705,375.

*To all whom it may concern:*

Be it known that I, GIUSEPPE DI STANISLAO, a subject of the King of Italy, residing at Camden, in the county of Camden and State of New Jersey, have invented new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to new and useful improvements in talking machines, and has for its object to provide a device of this character, in which the different supports, the horn, a number of records and other accessories used in the playing of a talking machine, may be held in the casing and cover thereof making a relatively small compact package permitting the same to be readily transported from place to place in a single covering.

A further object of the invention is to provide a collapsible bracket or support for the horn which may be readily placed in the drawer of the casing or cabinet.

A further object of the invention is to provide an adjustable rest for the smaller end of the horn in order that the reproducer may be held out of contact with the record disk or turn table while the needles are being changed or when the machine is not being played.

Another object of the invention is to produce a sectional horn, the sections of which may be taken apart and telescoped one in the other within the cover of the cabinet.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by numeral to the accompanying drawing forming a part of this specification, in which—

Figure 1, is a side elevation of my improved talking machine, the cover of the cabinet being removed and showing the horn engaging the rest. Fig. 2, a side elevation of the horn support or bracket a portion thereof being broken away to clearly illustrate the construction. Fig. 3, a similar view at right angles to Fig. 2. Fig. 4, a side elevation of the hinged or pivot member for mounting the horn upon the bracket. Fig. 5, an edge view thereof. Fig. 6, a vertical

sectional view of the cabinet and cover thereon, showing the horn in said cover and illustrating the position of the different parts when the machine is ready for transportation. Fig. 7, a side elevation of the horn disconnected and having portions thereof broken away to clearly illustrate the construction. Fig. 8, a vertical sectional view of a portion of the cabinet, showing an edge view of the rest. Fig. 9, a similar view illustrating the front elevation of the rest, and Fig. 10, a perspective view of one form of cover or carrying case.

In carrying out my invention as here embodied, 2 represents a cabinet which may be of any suitable size, design and configuration adapted to hold a motor as will be hereinafter described.

The cabinet preferably comprises four similar side walls 3, to the lower edges of which is secured the base or bottom 4 and between the walls some distance above said base is mounted a partition 5 forming a drawer chamber 6, between said partition the base in which slides the drawer 7, having a knob 8 or its equivalent whereby said drawer may be moved inward or outward.

In proximity to the upper edges of the side walls are secured strips which entirely surround the interior thereby producing the flange 9 which is grooved as at 10 to receive the supporting partition 11, said flange and partition forming with the partition 5, a motor chamber 12. Secured to the partition 11 and depending therefrom is a suitable motor 13, the stem 14 of which projects upward through the partition 11 and carries the turn table 15 on which rests the record disk when being played. Secured to the inner faces of the side walls above the flange 9 is a suitable relatively narrow ledge 16 which projects above the upper edges of the side walls and fits within the cover to be hereinafter described.

In one of the side walls of the cabinet are formed the openings 17, one above the other and these are covered with a plate 18 having openings 19, one above the other but smaller in length vertically thereby forming a pair of pockets 20 for the reception of the pair of hooks 21 carried by the base section 22 of the horn support or bracket 23, and to said base section is hinged the head section 24 at 25. The free end of said head section has an upwardly projecting extension 26 in which is formed the vertical open-



ing 27 in which is rotatably mounted the spindle 28, formed with one of the parts 29 of the hinged or connecting member 30, and to said part 29 is hinged or pivoted the other  
 5 part 31 by means of a rivet or its equivalent 32 and with the part 31 is formed the pintle 33 which passes through a portion of the horn 34 and has a nut 35 threaded thereon to prevent accidental displacement.

10 36 represents a metallic plate secured to the inner face of one of the side walls projecting above the flange 9, and having an extension 37 formed therewith, which lies along the face of said side wall above the  
 15 flange 9. To this plate is secured a casing 38, said plate preferably forming one wall thereof, and said casing projects through an opening 39 in the flange 9, and the upper end of said casing terminates in line with  
 20 the outer face of said flange. In this casing is slidably mounted the slide 40 having at its lower end a foot or projection 41. With the upper end of the slide 40 is formed a bearing 42 in which is journaled the rest  
 25 43. Across the plate 36 and its extension 37 lies a rib or stop 44 spaced apart from the flange 9 forming a space 45 in which the foot 41 may slide. The rib 44 is also spaced apart from the plate 36 throughout a por-  
 30 tion of its length so that the slide 40 may work therein and when said slide is drawn upward, the foot 41 will contact with said rib and prevent the slide from being entirely withdrawn and by moving the slide  
 35 to one side the foot will enter the space 45 and the slide will rest upon the flange 9 to prevent it from being accidentally displaced. At the upper edge to one side of the cabinet are mounted the fastening mem-  
 40 bers or hooks 46, the outer ends of which enter openings 47 in one of the side walls of the cover 48, said openings being surrounded by plates 49 each having a hole 50 therein. In the side of the cabinet opposite  
 45 the side carrying the hooks is mounted a keeper 51 adapted to receive the bolt 52 of the lock 53 mounted in one of the side walls of the cover whereby said cover may be locked to the cabinet to prevent the use of  
 50 the machine by unauthorized persons and also to prevent said cover from being accidentally displaced while the machine is in transportation.

55 The cover 48 may be made in any suitable design having side walls 54 and a top 55, said top carrying a depending centering projection 56 which is preferably cylindrical in shape and the end thereof is reduced in circumference to form the extension 57. On  
 60 the interior of the cover is hinged a door or partition 58, by means of hinges 59 or their equivalent, the free end of said door being held closed by a turn buckle 60 fastened in place by a screw 61 or its equivalent  
 65 to one of the side walls of the cover. Said

door or partition 58 carries a pull strap 62 so that the same may be readily opened. Between the hinged partition 58 and the top 55 of the cover is formed a horn cham-  
 70 ber 63 and on the inner face of the hinged partition is produced an annular rib 64.

In order that the horn may be placed in the cover of the cabinet, it must be collapsible in form and I preferably produce said  
 75 horn in a number of sections.

65 represents the bell, the inner end of which carries an internally threaded ring 66 into which is threaded the externally thread-  
 80 ed ring 67 carried by the co-acting end of the middle section 68, the opposite end of said section also carrying an externally threaded ring 69 which is threaded into the internally threaded ring 70 carried by the  
 85 co-acting end of the end section 71. The opposite or smaller end of this last named section has mounted thereon a ring 72 provided with a lug or fastening teat 73 adapted to register with the slot 74 in one end of the  
 90 elbow 75. The opposite end of said elbow is provided with a flange 76 which acts as a bearing surface for the reproducer 77. Within the flanged end of the elbow 75 is mounted the tubular projection 78 which is  
 95 spaced apart throughout a portion of its length from the walls of the elbow and this projection is provided with a slot 79 with which registers the lug 80 formed on the inner face of the tubular portion 81 of the  
 100 reproducer, said tubular portion surrounding the tubular projection 78 and entering the space between the walls of said projection and the walls of the elbow.

In order to describe the operation of the device, I will suppose that the machine is  
 105 about to be put into use. The cover is first unlocked and removed, after which the drawer 7 is opened and the support or bracket 23 removed therefrom and opened as shown in Fig. 2, after which the hooks 21  
 110 are inserted through the openings 19 into the openings 17 and by forcing the support downward, said hooks will enter the pockets 20 thus firmly holding the support in place upon the cabinet. The hinged partition 58  
 115 is then opened by turning the turn buckle 60 to one side, after which the three sections 65, 68 and 71 may be removed from the cover 48 and each section secured to its adjacent section by means of the threaded  
 120 rings. The elbow 75 is next removed from the drawer and is secured to the end section 71 of the horn after which the reproducer 77 is removed from the draw and mounted in position upon the elbow. The horn is then  
 125 placed upon the bracket by inserting the spindle 28 of the hinged member 30 in the opening 27 in the support 23, the free end or that end of the horn which carries the reproducer is then allowed to lie upon the  
 130 rest 43, the same having been raised to the



position shown in dotted lines in Fig. 9, by withdrawing the slide 40 from its casing and moving it to one side so that the end of said slide rests upon the flange 9. The machine is then ready to be used and by winding up the motor in the ordinary manner, the turn table 15 will be caused to revolve and this is adapted to carry one of the record disks. When the machine is to be taken apart to be set aside for the time being or to be transported, the support 23 is removed, folded and placed in the drawer, the horn disassembled and the elbow and reproducer placed in the drawer, while the sections 65, 68, and 71 are placed in the cover, the smaller end of the bell section 65 resting against the inner face of the top 55, and surrounding the projection 56 but spaced some distance therefrom. The middle section 68 is then placed within the bell section so that the smaller end of said middle section surrounds the projection 56 and snugly fits the same, and after this section is in place, the end section is placed on the end of the projection 56 so that the smaller end of the last named section surrounds the extension 57. The hinged partition is then closed and held in place by the turn buckle 60. When said hinged partition 58 is closed, the annular rib 64 carried thereby surrounds the end of the end section 71 and also rests inside of the end of the middle section 68. When the sections of the horn are in this position, the hinged partition 58 engages their outer ends and prevents them from being knocked about within the cover. The slide 40 is then moved to one side until it is in alinement with its casing, after which it may be inserted therein as will be readily understood. The cover is next placed upon the cabinet by inserting the fastening members 46 into the holes 47 in one of the side walls of said cover and the edges of the balance of the side walls of the cover allowed to rest upon the upper edges of the walls of the cabinet, after which the bolt of the lock may be caused to engage the keeper.

In Fig. 10, I have shown one form of

carrying case or cover used for transporting the talking machine, in which 85 represents the bottom having a pair of oppositely disposed double side walls 86, said double side walls being relatively low and parallel. To the ends of the bottom are hinged the oppositely disposed semi-sectional body members 87 one of which over-laps the other. Said body members correspond with the outer contour of the talking machine cabinet and cover and these body members each carry a handle 88 whereby they may be held together and the machine carried about.

Of course I do not wish to be limited to the exact details of construction as here shown as these may be varied within the limits of the appended claims without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful, is—

1. In a talking machine a cabinet for holding the reproducing mechanism, a cover for said cabinet having a horn chamber, a plate provided with an extension carried by the interior of the cabinet, a casing carried by said plate, a slide provided with a foot mounted in said casing, a rest rotatably mounted upon the outer end of the slide, and a stop disposed across the plate and its extension, a portion thereof being spaced from said plate and extension, thereby forming an opening through which the slide passes.

2. In a device of the character stated, a cabinet for holding a reproducing mechanism, a cover detachably secured to the cabinet, the top of said cover having a depending projection, the end of which is reduced in circumference to form an extension, a partition hinged to the cover and an annular rib carried by the inner face of said partition as and for the purpose specified.

In testimony whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses.

GIUSEPPE DI STANISLAO.

Witnesses:

MARY E. HAMER,

M. H. LO REE.



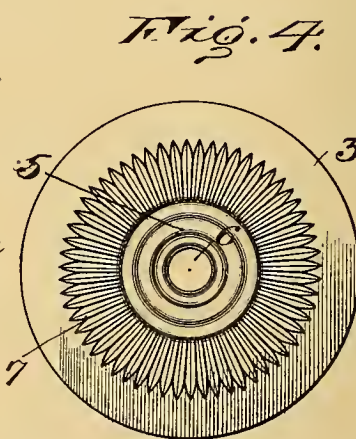
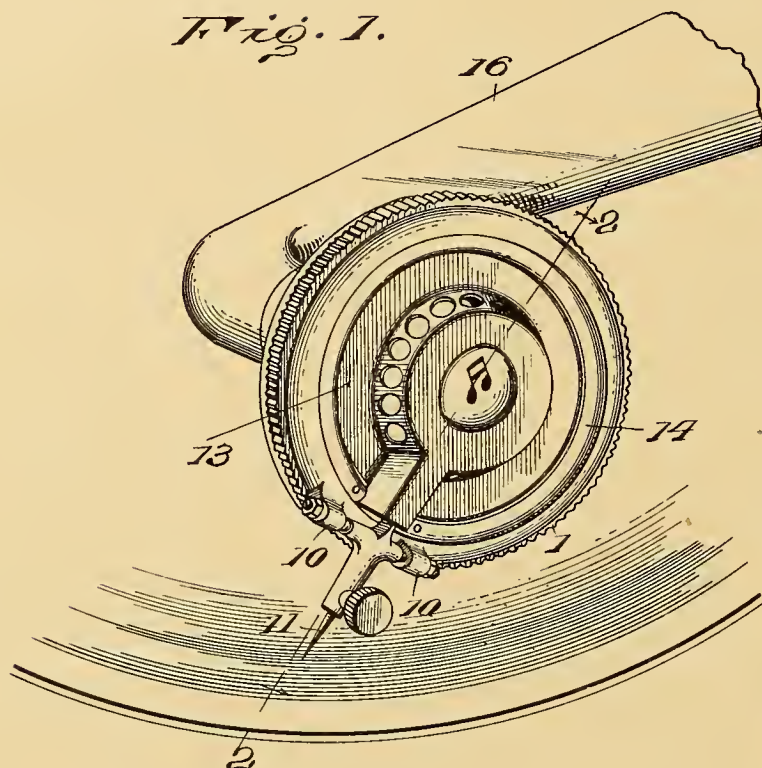




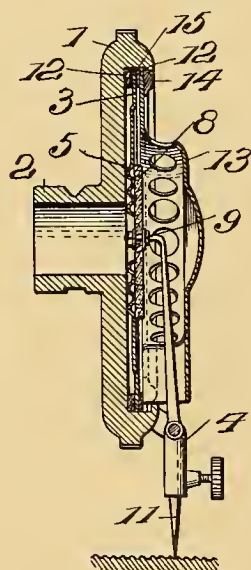
C. E. WOODS.  
 REPRODUCER FOR TALKING MACHINES.  
 APPLICATION FILED MAY 29, 1913.

1,096,661.

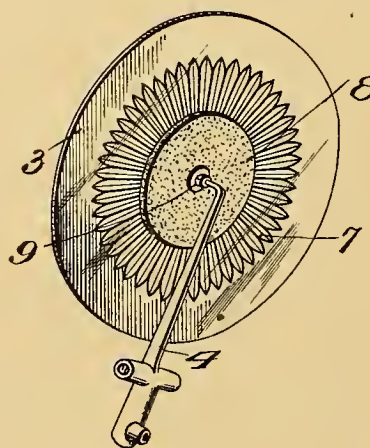
Patented May 12, 1914.



*Fig. 2.*



*Fig. 3.*



Inventor

*Clinton E. Woods.*

Witnesses  
*James H. Anderson*  
*E. E. Warfield*

By *Mauro. Cameron. Lewis & Massie*  
 Attorneys



# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## REPRODUCER FOR TALKING-MACHINES.

1,096,661.

Specification of Letters Patent.

Patented May 12, 1914.

Application filed May 29, 1913. Serial No. 770,718.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, a citizen of the United States, residing at Bridgeport, Connecticut, have invented a new and useful Reproducer for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to reproducers for talking machines, and while the invention in some of its phases is applicable to the reproduction of either the vertically undulating or the laterally undulating style of record, the greatest benefits through its use are secured in connection with the laterally undulating or zig-zag form of record groove.

In many records there are portions in which the amplitude of vibration of the recorded sound greatly exceeds that of the main body of the record. So also in some records the amplitudes of the vibrations of the record taken as a whole greatly exceed those of other records in which the amplitude is comparatively small. Little difficulty is experienced in reproducing the sounds represented by the undulations of minute or of the average amplitude of vibration, but when the stylus bar is actuated by the undulations of great amplitude, a sudden blow is struck upon the diaphragm, producing harsh and disagreeable reproductions, commonly referred to in the art as "blasts," and it is one of the objects of the present invention to provide a reproducer which shall avoid the "blasts" or harsh and foreign noises referred to. This is accomplished in the present invention by providing a connection between the stylus bar and the diaphragm which shall be sufficiently rigid and unyielding to transmit all of the smaller or more minute vibrations from the record to the diaphragm undiminished, which connection, however, is slightly yielding in character under the influence of a sudden or harder blow which would be transmitted as the result of the stylus of the reproducer being actuated by the undulations of great amplitude. The result of this construction is that the blow which would be imparted to the diaphragm by the undulations of great amplitude is cushioned, thereby softening down the resultant note in reproduction, and avoiding the "blast" or harsh and foreign noise heretofore resulting from this cause.

It has heretofore been proposed in reproducers for talking machines to employ a diaphragm of metal, such as aluminum, having annular corrugations on the central portion of the diaphragm with radial corrugations extending from the annular corrugations out toward the periphery of the diaphragm. Such diaphragm, when made of aluminum, possesses many superior and desirable qualities, but it has been found that in actual practice it is liable to become buckled, thus materially lessening the fine qualities of the reproducer.

A further object, therefore, of the present invention is to provide means whereby the buckling of such diaphragm may be avoided and its fine qualities preserved.

In its preferred form, therefore, the invention consists of a metallic diaphragm, preferably of aluminum, having an axial opening of some considerable extent, preferably from three-eighths to one-half inch in diameter, surrounding which opening there is a plurality of annular corrugations on the central portion of the diaphragm with radial corrugations extending from the annular corrugations outward toward the periphery of the diaphragm. Secured over the axial opening is a cork disk which is much thicker than the diaphragm itself and of a diameter approximating that of the outer annular corrugation, the cork disk being secured to the diaphragm in any suitable way, as by cement. The end of the stylus bar opposite the stylus proper is connected preferably to the center of this cork disk, and the diaphragm is mounted in a suitable frame or box of metal between cork gaskets, the whole being held in place in any suitable manner, as by an elastic split ring, whose outer periphery enters an undercut groove in the walls of the diaphragm casing. If desired, the diaphragm may be, and preferably is, protected by a suitable shield or cover which likewise may be held in place by the split ring.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only, and are not designed to define the limits of the



invention, reference being had to the claims for this purpose.

In the drawings:—Figure 1 is a perspective view of the reproducer mounted in position on the end of a suitable tone arm; Fig. 2 is a central sectional view on the line 2—2 of Fig. 1; Fig. 3 is a perspective view of the diaphragm, cork disk, and the stylus bar separated from the sound box or casing.

Fig. 4 is a plan view of the diaphragm alone.

In said drawings, 1 indicates the diaphragm frame or casing of the usual or any suitable construction, preferably of metal, and 2 the central neck or hub thereof, while 3 indicates the diaphragm proper, and 4 the stylus bar. The diaphragm 3 is preferably provided with annular corrugations 5 surrounding an axial opening 6 which is of some considerable extent, preferably being from three-eighths to one-half inch in diameter. Radiating from the annular corrugations 5 outward toward the periphery of the diaphragm are radial corrugations 7. Secured over the central portion of the diaphragm is a disk 8 of cork, which should be of fine quality and of some considerable thickness and preferably has a diameter approximating that of the outer annular corrugation 5. This cork disk is secured to the diaphragm in any suitable way, preferably by cement, and the stylus bar 4 has its inner end 9 secured to the cork disk in any approved manner, and is fulcrumed at 10, 10, on the diaphragm box or casing, and carries the stylus proper 11 at its outer end. The diaphragm is mounted in the casing 1 between cork gaskets 12, 12, and over the outer gasket 12 is placed a suitable cover or shield 13. The parts thus positioned are held in place by a split ring 14 having a peripheral flange which enters an undercut groove 15 on the inner wall of the diaphragm casing, as clearly shown in Fig. 2. As thus constructed, the sound box is designed to be mounted in any suitable way upon a proper support, such as the usual tone arm 16.

In operation, the stylus 11 rests in and is actuated by the undulations of the record groove and is thereby caused to impart corresponding vibrations to the diaphragm 3. The stylus bar, however, is not connected to the diaphragm, but to the cork disk 8. This cork disk is of such a rigid character, however, that it does not yield under the impulses of the stylus bar, due to the more minute undulations (those of lesser amplitude) of the record, and therefore imparts the vibrations corresponding to such undulations to the diaphragm undiminished. When the stylus bar 11, however, is actuated by undulations of the record groove of great amplitude, a sudden or harder blow is imparted to the cork disk 8, under which it yields more or less, depending on the amount of increase of the amplitude of vi-

bration, so that the blow, due to the increased amplitude, is cushioned or softened and the "blast," heretofore resulting from undulations of great amplitude, is avoided. The cork possesses superior qualities as the yielding medium between the stylus bar and the diaphragm, by reason of the fact that it is impervious to moisture and will not deteriorate through oxidation as the result of long exposure to the air, and it therefore preserves its superior qualities throughout a long period of time. Furthermore, it has been found that when the aluminum diaphragm, corrugated as described, is provided with a central opening of considerable extent and the cork disk employed in connection therewith as the means for uniting the stylus bar with the diaphragm, the buckling action heretofore experienced with such diaphragms is eliminated, while at the same time preserving the fine qualities of this class of diaphragms.

While the invention has thus been described with considerable particularity, in order that the best form of the invention may be readily understood, the invention is not limited to the specific details hereinbefore set forth, since changes may be made in many of the details of construction, without departing from the true spirit of the invention as defined in the appended claims.

Having thus described my invention, what is claimed is:—

1. In a sound box, the combination of a diaphragm casing, a diaphragm having an enlarged central opening therethrough, a disk of cork secured to said diaphragm over said opening, and a stylus bar secured to said disk and out of contact with the diaphragm.

2. In a sound box, the combination of a diaphragm casing, and a diaphragm having a central opening therethrough and annular corrugations surrounding said opening, with a cork disk secured to said diaphragm over said corrugations and opening, and a stylus bar connected to said disk.

3. In a sound box, the combination of a diaphragm casing, a metallic diaphragm having a central opening, and annular corrugations surrounding said opening, a cork disk secured to said diaphragm over said opening and annular corrugations, and corrugations on said diaphragm extending radially from said annular corrugations.

4. In a sound box, the combination of a diaphragm casing, a metallic diaphragm mounted therein, said diaphragm having an enlarged central opening, with a disk of cushioning material secured to said diaphragm over said opening, and a stylus bar secured to said disk and out of contact with the diaphragm.

5. In a sound box, the combination of a diaphragm casing and a diaphragm mount-

ed therein between cork gaskets and having  
a central opening surrounded by annular  
corrugations with radial corrugations ex-  
tending therefrom, with a cork disk secured  
5 to said diaphragm over said opening and  
annular corrugations, and a stylus bar se-  
cured to said cork disk.

In testimony whereof I have signed this  
specification in the presence of two subscrib-  
ing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

J. S. GRIFFITH.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."







W. W. YOUNG.  
METHOD OF MAKING ACOUSTIC DIAPHRAGMS.  
APPLICATION FILED SEPT. 23, 1910.

1,097,499.

Patented May 19, 1914.

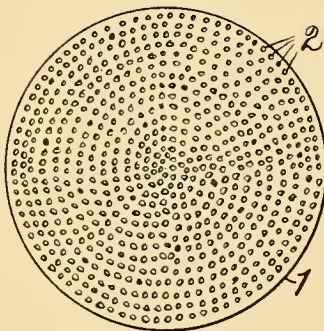


FIG. 1 -

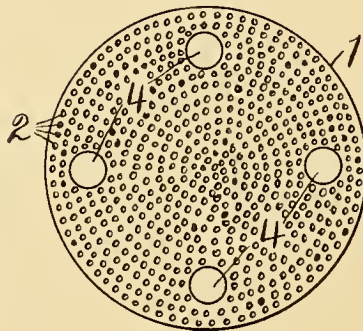


FIG. 2 -

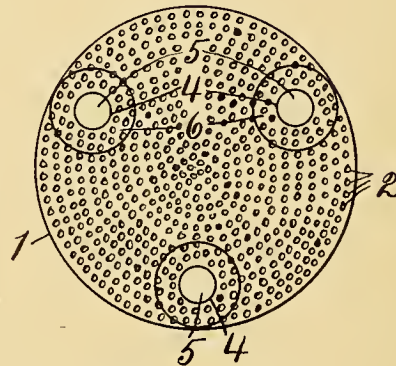


FIG. 3 -

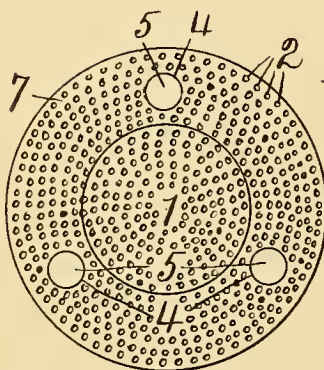


FIG. 4 -

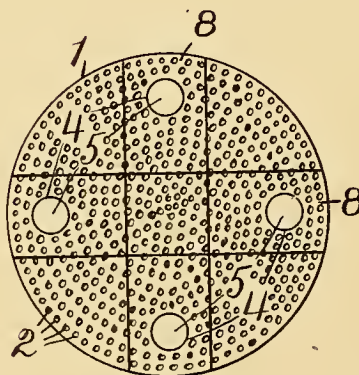


FIG. 5 -

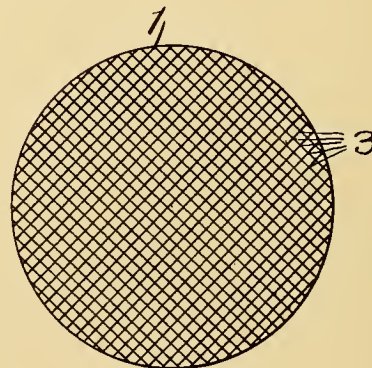


FIG. 6 -

WITNESSES:

A. C. Fairbanks.  
J. M. Davenport

INVENTOR.

William W. Young,  
BY  
Webster & Co.,  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF AGAWAM, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO LUCY A. YOUNG, OF AGAWAM, MASSACHUSETTS.

## METHOD OF MAKING ACOUSTIC DIAPHRAGMS.

1,097,499.

Specification of Letters Patent.

Patented May 19, 1914.

Original application filed September 7, 1909, Serial No. 516,555. Divided and this application filed September 23, 1910. Serial No. 583,383.

*To all whom it may concern:*

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Agawam, in the county of Hampden and State of Massachusetts, have invented a new and useful Method of Making Acoustic Diaphragms, of which the following is a specification, the same being a divisional part of my application Serial No. 516,555, filed in the United States Patent Office September 7, 1909.

My invention relates to improvements in methods of making acoustic diaphragms for talking-machines, telephones, and the like, and consists broadly and generally in roughening or indenting one or both surfaces or faces of a diaphragmal member and applying thereto a compound, emulsion, solution, or mixture which is capable of hardening and forming a coating and of permanently uniting with said member, as hereinafter set forth.

The object of my invention is to produce an acoustic diaphragm, of the class mentioned above, which possesses superlatively in addition to the absolutely essential the otherwise desirable and long sought characteristics and qualities of a device of this kind, among which characteristics and qualities mention may be made here of durability and stability, resiliency and resonance, capability of giving out clear, loud and distinct tones of great volume and depth, and of evenly distributing the sound waves, and immunity from blasts and scratching sounds and other alien and discordant noises.

Other objects will appear in the course of the following description.

A diaphragm constructed in accordance with the method broadly and generally outlined above may be improved for some and probably many purposes by perforating it and transforming the perforations or perforated parts into lesser diaphragms, or even by perforating and leaving the perforations open, as will be subsequently explained.

In the accompanying drawings, which form part of this application and in which like characters of reference indicate like parts throughout the several views—Figure 1 is a face view of an imperforate diaphragm, and Fig. 2, a similar view of a perforated diaphragm, both made in accordance with my method; Figs. 3, 4 and 5, each

a face view of a diaphragm including some form of the lesser-diaphragmal feature and made in accordance with said method, and, Fig. 6, a face view of a diaphragm produced in the same manner as the others except that it is checked instead of pitted.

I will now explain in detail how the diaphragm is produced, but wish first to state that said diaphragm may be made individually, that is, by itself, or a strip or sheet may be prepared and the diaphragm cut from that, whichever way is most practical with any given material or materials. For the sake of brevity I will apply the following description to a single diaphragm, with the understanding that such diaphragm might constitute a part of a strip or sheet from which it is to be cut at some particular stage or at the end of the manufacturing process.

In the simplest or primary form of my invention, that shown in either the first or last view, I take a disk 1 of some suitable material and by means of dies or other suitable appliances or instruments pit in the first instance and check in the second instance one or both surfaces, preferably both, of said disk, and then treat the pitted or checked disk with a compound, emulsion, solution or mixture which possesses the necessary qualifications, or if the disk be of fiber then the pitting or checking is not done until after first applying such mixture. The pits, represented at 2, and the checks, represented at 3, may be regular or not, as desired, but are usually quite small and close together, although for some purposes and in some cases they will be coarse. Considerable latitude should be allowed in the matter of breaking up, roughening or indenting the surface or surfaces of the disk, since the only essential thing is to obtain the unevenness, although for talking-machines the pitted diaphragm has been found to give as good if not better results than one having merely roughened surfaces. The checking approaches very closely in effect and result the pitting, but if in place of the former either set of cross cuts was omitted, as might be done, the appearance at least would be changed and it is doubtful if the results would equal those obtained in the other cases. As already noted, however, I do not desire or intend to be limited to any particular means for or method of, roughening, in-



denting, or otherwise rendering irregular the disk surfaces, nor to any particular design for such surfaces.

The aforesaid mixture is applied to the disk 1, after indenting if a metallic disk and before if a fibrous disk be used, in any convenient manner, generally by dipping the latter in the former, although such mixture might be put on with a brush or its equivalent. After receiving or being coated with the proper amount of the mixture, the disk thus prepared, if of fiber, is exposed to air or subjected to heat to partially dry the coating, then it is pressed between suitable dies to indent it, next the treated and indented disk is again treated with the mixture, and finally it is baked. After coating the indented metallic disk one or more times, and partially drying if more than one coat be applied, the same is baked. The resulting diaphragm in either case is an excellent acoustic medium, such as I have defined in the early part of this specification.

A variety of different kinds of metallic and non-metallic materials may be employed for the disk 1, but any material to be thus employed should be thin and must be of a nature well adapted to take the mixture when properly applied thereto and enable such mixture to unite therewith, and possess the necessary qualities of then producing the desired effect. Thin sheet-aluminum and pure linen-fiber paper or card-board are among the best materials and give some of the best results.

The imperforate diaphragms shown in Figs. 1 and 6 are the resulting products of the method hereinbefore outlined. In Fig. 2 appears a diaphragm having a number of perforations 4 therein, otherwise it is similar to the two just mentioned and is produced by the same method. The perforations are generally cut before the mixture is applied to the disk. The surfaces of the Fig. 2 diaphragm may be checked like those of the Fig. 6 diaphragm, instead of being pitted and having the resulting pebbly effect indicated in all of the views except the last, and this is true of the Figs. 3, 4 and 5 diaphragms. So, also, is it true that any kind of surface roughening or indenting which is applicable to one form of diaphragm is applicable to all.

For many if not most uses to which my diaphragm is to be put, I find it very advantageous to perforate the disk 1 and to cover such perforations with very thin material, such as tissue paper for example, which forms lesser or minor diaphragms 5 on or in the diaphragm proper or major diaphragm. These lesser diaphragms may be made by using individual disks 6 with which to cover the perforations 4 separately, as in Fig. 3; or a ring 7 with which to cover the perforations collectively, as in Fig. 4;

or cross strips 8—8 the terminals of which extend across the perforations, as in Fig. 5; or the lesser diaphragmal material applied in some other form to the disk 1 so as to cover the perforations. The lesser diaphragmal material or integument, whatever its form or shape, is applied to the pitted, indented or roughened metallic disk after a first application of the mixture in this case, and to the fibrous disk while in its plain or unindented condition, but after a first application of said mixture, nevertheless; then more of the mixture is applied, and the disk with its accretions is baked, excepting in the case of the fibrous disk which must be partially dried and subjected to the dies which indent it before the second application of the mixture and the baking. The method in either of the above cases is the same as that previously described, with the lesser-diaphragmal feature added.

The integument is so applied to the disk that it forms a close union therewith at substantially all points in the area of said integument.

The perforations 4 may be of various shapes and sizes, arranged in any desired form regularly or irregularly, and more or less numerous in any given case.

The material or combination of materials used for coating the disks, and the integuments when present, including both sides of the lesser diaphragms 5, must be of such a nature that the same will adhere firmly to the parts and saturate or impregnate the fibrous disks, and also cause such integuments to adhere firmly to the disks; furthermore, the nature of the coating must be such that it will so unite with the other elements and harden during the process of manufacturing the diaphragms as to produce devices having the required stability, permanence and excellence.

I prefer to employ for such coating silicate of soda or silicate of potash, oxid of zinc, and an earth cement, the proportions of which may vary to some considerable extent without seriously affecting the efficiency of the mixture made therefrom. As a working basis for compounding the mixture, however, one part each of the oxid of zinc and the cement to twenty parts of the silicate of soda or silicate of potash may be taken. The mixture in baking becomes hard and in this condition is fixed on the disks, and in them when fibrous, to which it is applied and firmly, completely and permanently unites the several elements or materials into an integrate structure.

In addition to the variations already noted others may be made without departing from the nature of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of making acoustic dia-

phragms, of the class described, consisting in perforating suitable thin material, in applying a suitable coating to such material and causing the same to harden thereon, and  
5 in applying a suitable integument to the perforated parts of said material, while the coating on said material is in a moist condition and without covering the entire area of the material with the integument, and in  
10 surface breaking said material at some stage in the process of manufacture.

2. The method of making acoustic diaphragms, of the class described, consisting in perforating a disk of suitable material, in  
15 applying a suitable coating to such disk, in applying to the perforated parts of the coated disk, without covering the entire disk, a suitable integument, the latter being

applied while such coating is in a moist condition, in again applying the coating and  
20 causing the same to harden, and in surface breaking said disk at some stage in the process of manufacture.

3. The method of making acoustic diaphragms, of the class described, consisting,  
25 first, in applying a suitable coating to fibrous material; second, in partially drying said material with its accretions; third, in surface breaking said material; fourth, in applying more of said coating, and, fifth,  
30 in causing the coating to harden.

WILLIAM W. YOUNG.

Witnesses:

F. A. CUTTER,

A. C. FAIRBANKS.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."







A. FISCHER.  
FLEXIBLE JOINT FOR THE TONE ARMS OF TALKING MACHINES.  
APPLICATION FILED JUNE 29, 1911.

1,097,618.

Patented May 26, 1914.

Fig.1.

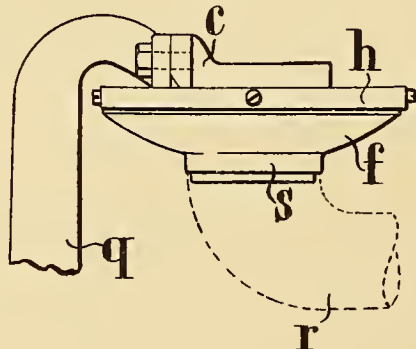


Fig.2.

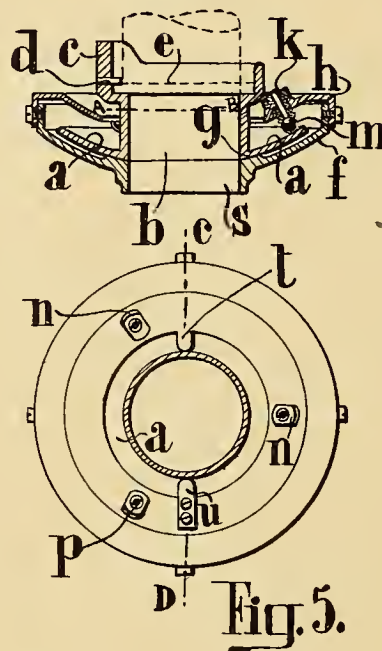


Fig.4.

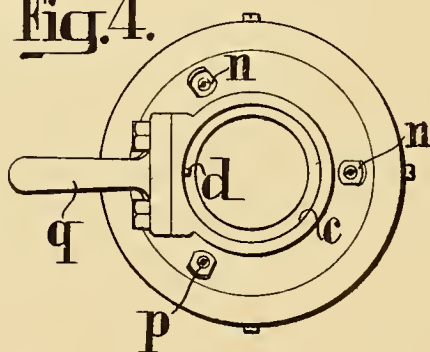


Fig.5.

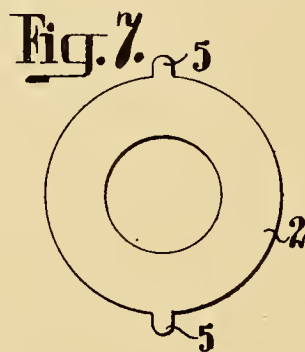


Fig.3.

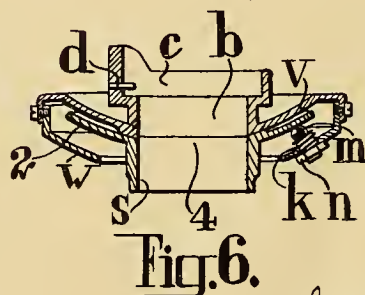
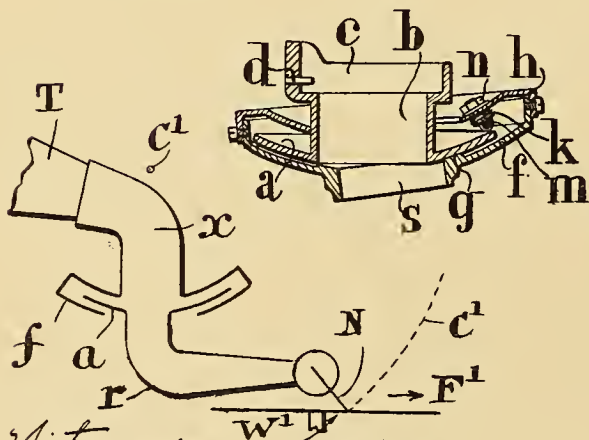


Fig.8.

Witnesses.  
E. B. Franzoni  
M. E. Burrell

Inventor.  
Alex Fischer  
By his Attorneys  
Baldwin & Wright



# UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF KENSINGTON, LONDON, ENGLAND.

FLEXIBLE JOINT FOR THE TONE-ARMS OF TALKING-MACHINES.

1,097,618.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed June 29, 1911. Serial No. 636,004.

*To all whom it may concern:*

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 8 Maclise road, Kensington, London, England, have invented certain new and useful Improvements in Flexible Joints for the Tone-Arms of Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention refers to flexible joints for the tone arms of talking machines and has for its object the removal of the tendency to bind, that in joints for which I obtained Letters Patent No. 879755 has been found to occur between the convex portion of the flange attached to the moving member and the concave portion of the flange attached to the fixed member.

The flexible joint made according to my present invention comprises as in the previous case, two members, a fixed member in connection with the trumpet and a movable member in connection with the tone arm, but in place of providing curved flanges with their center of curvature on the same side of the joint as the moving member, I provide a flange in connection with one of the members which flange is curved and has the center of curvature located on the same side of the joint as the fixed member the other member being provided with a bearing surface corresponding to and concentric with the aforesaid flange and being in addition provided with parts extending beyond and around the edge of the flange carrying means coming on the other side of the flange to keep the flange and the corresponding surface in contact.

In one way of carrying out my present invention, in place of providing a convex flange on the moving member coming between two flanges attached to the fixed member, I provide the fixed member with a convex flange such flange being convex at the outer and concave at the inner surface, the curvatures being both struck from the same center and I provide the moving member, that is the tone arm, with two flanges curved so as to correspond to the inner and outer surfaces of the aforesaid fixed member and connected together so as to form a species

of cap. The moving member is thus supported by the two flanges attached to it and enabled to move in conformity with the convex flange of the fixed member.

I may either have the two flanges attached to the moving member coming directly into contact with the convex flange attached to the fixed member in a manner analogous to that described and shown in connection with Figure 3 of my aforesaid specification or I may employ balls coming between any of the bearing surfaces either resting directly upon such surfaces or working in grooves therein. Where it is desired to adjust the balls I provide screws coming at the back of the balls, which screws pass through the cap. I prefer that the directions in which the holes or grooves for the reception of the balls are drilled shall be radial with respect to the center of rotation of the joint.

In another way of carrying out my invention I provide the moving member with a flange and the fixed member with two flanges forming a species of cap. In this case also I arrange that the center of curvature is on the trumpet side of the joint, corresponding alterations being made in the rest of the construction.

In the case where I dispense with the grooves on the intermediate flanges and use balls merely touching this flange, or where I dispense with the use of ball bearings altogether, I may provide the moving member with lugs in order to prevent the rocking over motion of the sound box. And in order that my said invention may be better understood, I will proceed to describe the same with reference to the drawing accompanying this specification, in which:—

Fig. 1 shows side elevation of one form of my joint; Fig. 2 shows same in vertical longitudinal section; Fig. 3 shows similar view to Fig. 2 but with the moving member in its extreme position. Fig. 4 shows plan of Fig. 1. Fig. 5 shows plan of Fig. 2 with a portion cut by the line A B Fig. 2 in section. Fig. 6 shows sectional elevation similar to Fig. 2 of another form of my invention. Fig. 7 shows plan of a detail. Fig. 8 is a diagram of the essential features of the invention.

The same letters and numerals of reference are employed to denote the same parts in all the views.



*a* shows convex flange which is attached to the exit tube *b* provided at the top with a socket *c* forming the fixed member, and a pin *d* for retaining the flange *e* of the trumpet elbow in position.

*f* shows a flange similarly curved to the convex flange *a* and provided with a bearing surface *g* which works against the underside of the flange *a*. The flange *f* has attached thereto a ring like cap or cover *h* forming with the flange *f* the movable member. This cover *h* is made preferably of a similar curvature to the flanges *a* and *f*.

*k* are screw plugs provided with a concavity at the end in which balls *m* are mounted. These screws *k* screw through the cap *h* in such a manner that the ball *m* and the screw are radial to the center of the curvature of the top of the flange *a*, the fixed member.

*n* is a lock nut around the screws and *p* is a hole passing through the screw *k* to allow for lubrication when required. The balls *m* of which three are provided in the forms shown in the drawing work upon the top of the flange *a*, the fixed member, and are so adjusted that the bearing face *g* of the flange *f* moves against the underside of the flange *a* with the minimum amount of friction necessary for a sound tight joint. It should be observed that the curvature of all the working surfaces is struck from the same center and that such center is on the trumpet side of the joint.

*q* shows a bracket, see Figs. 1 and 4 to which is fixed the socket *c* thus holding the flange *a* stationary.

It will be seen that it is possible to move the flange *f* and with it the cap *h* forming the movable outer member in any direction with respect to the flange *a*, the fixed inner member, for example it may be given a rotary motion and a motion from side to side from any position.

*r* shows tone arm dotted at Fig. 1. This is attached to the opening *s* provided in the flange *f* and leading to the exit tube *b*. As the tone arm is attached to the opening *s* which is in one with the moving member it follows that the tone arm can move in any direction. Therefore when a sound box is on the end of the tone arm the sound box may have an up and down motion and a motion across the record, around the center of rotation of the tone arm.

In order to prevent the sound box from rocking over, that is to prevent the needle coming at the wrong angle with respect to the record I provide means for preventing the movable member moving from side to side. This will be seen at Fig. 5 where *t* shows a lug made with the cap *h*, and *u* shows a similar lug screwed to the cap *h* at the position of 180 degrees from the lug *t*. The lugs *t* and *u* project inwardly and come

in contact with the side of the exit tube *b* of the fixed member thus preventing any side action along the line *C D* of Fig. 5.

Referring to Figs. 6 and 7 in this case in place of providing the fixed member with one convex flange I provide the fixed member with two (outer) convex flanges *v* and *w* and the movable member with an (inner) similarly formed single flange 2.

*v* shows one of the flanges attached to the exit tube *b*, and socket *c* and a pin *d* for retaining the flange of the trumpet elbow. The flange *v* has attached to it at some distance therefrom a ring like cap or cover *w*. The flanges *v* and *w* and the exit tube *b* and the socket *c* forming the fixed member are held by a bracket similar to the bracket *q* Fig. 1. The movable member is formed with the single flange 2. The flange 2 works against the bearing surface of the flange *v*. The flange 2 is provided with a tube 4 leading to the opening *s* for attachment to the tone arm. The balls *m* in this case are held in the screws *k* as before only they point upward instead of downward as previously, and the screws *k* screw into the ring-like cap or cover *w*, the balls coming on the under side of the flange 2, the movable member. The curvature of all the working faces is struck from the same center and such center is on the trumpet side of the joint as in the previous case.

In order to prevent the rocking over of the sound box the movable member that is the flange 2 is provided with two lugs 5 which come in contact with the sides of the fixed member thus preventing the rocking over.

I may make my invention in many forms still keeping to the general principle of a flexible joint for the tone arm of talking machines, provided with a fixed convex flange or flanges correspondingly curved movable flanges or flange the curvature of the flanges being struck from a point on the trumpet side of the joint.

It will be observed that the center of curvature of both the flange *a* and the bearing surface *g* is well above the joint, thus providing a relatively long radius. In this way the needle at the outer end of the tone arm is made to traverse a relatively flat arc which is inclined in the direction of the pull of the record on the needle. By thus causing the needle to rise at a relatively sharp angle in the direction of the pull of the record on the needle, a very easy movement is obtained which is not interfered with when the table wabbles in the usual way.

Fig. 8 is a diagram of the essential features of the invention and indicates the manner in which it operates. *f* indicates that part of the joint which is connected at *x* with the trumpet *T*. *a* indicates that part of the joint connected with the tone arm *r* which carries the needle *N*. *C'* indicates

the center of curvature of the parts  $f$  and  $a$  and  $c'$  indicates an arc struck from the center  $C'$  and passing through the point of the needle. The record or table is indicated at  $W$ , and the arrow  $F'$  indicates a force which tends to pull the needle outward from the center of the record. When the table wabbles the needle moves in the arc indicated at  $c'$ .

10 What I claim as my invention and desire to secure by Letters Patent in the United States of America is:—

1. A flexible joint for the tone arm and trumpet of a talking machine, comprising a fixed member connected with the trumpet and a movable member connected with the tone arm, one of said members having a curved flange and the other member having a bearing surface corresponding to and concentric with said flange, and means acting on said flange for keeping it and the bearing surface in contact with each other, the center of curvature of said curved flange and bearing surface being on the same side of the joint as the fixed member and located well outside the joint whereby the needle on the outer end of the tone arm is made to traverse a relatively flat arc inclined in the direction of the pull of the record on the needle.

2. A flexible joint for the tone arm and trumpet of a talking machine, comprising a fixed member connected with the trumpet and a movable member connected with the tone arm, one of said members having a curved flange and the other member having a bearing surface corresponding to and concentric with said flange, means acting on said flange for keeping it and the bearing surface in contact with each other, the center of curvature of said flange and bearing surface being located well above said joint whereby the needle on the outer end of the tone arm will rise at a relatively sharp angle

in the direction of the pull of the record on the needle. 45

3. A flexible joint for the tone arm and trumpet of a talking machine, comprising a fixed member connected with the trumpet and provided with a concavo convex flange, a movable member connected with the tone arm having a bearing surface corresponding to and in contact with said flange, and means supported by the movable member for holding the bearing surface and the flange in contact with each other, the center of curvature of said flange and bearing surface being located well outside of and above the joint whereby the needle on the outer end of the tone arm is made to rise at a relatively sharp angle in the direction of the pull of the record on the needle. 50 55 60

4. A flexible joint for the tone arm and trumpet of a talking machine, comprising a fixed member connected with the trumpet and provided with a concavo convex flange, a movable member connected with the tone arm having a bearing surface corresponding to and in contact with the flange, a cap supported by the movable member, screw plugs carried by this cap, balls at the outer ends of said screw plugs bearing on the concavo convex flange and holding it in contact with said bearing surface, the center of curvature of said flange and said bearing surface being located outside of and well above the joint whereby the needle on the outer end of the tone arm is made to traverse a relatively flat arc of large radius inclined in the direction of the pull of the record on the needle. 65 70 75 80

In testimony whereof, I affix my signature, in presence of two witnesses.

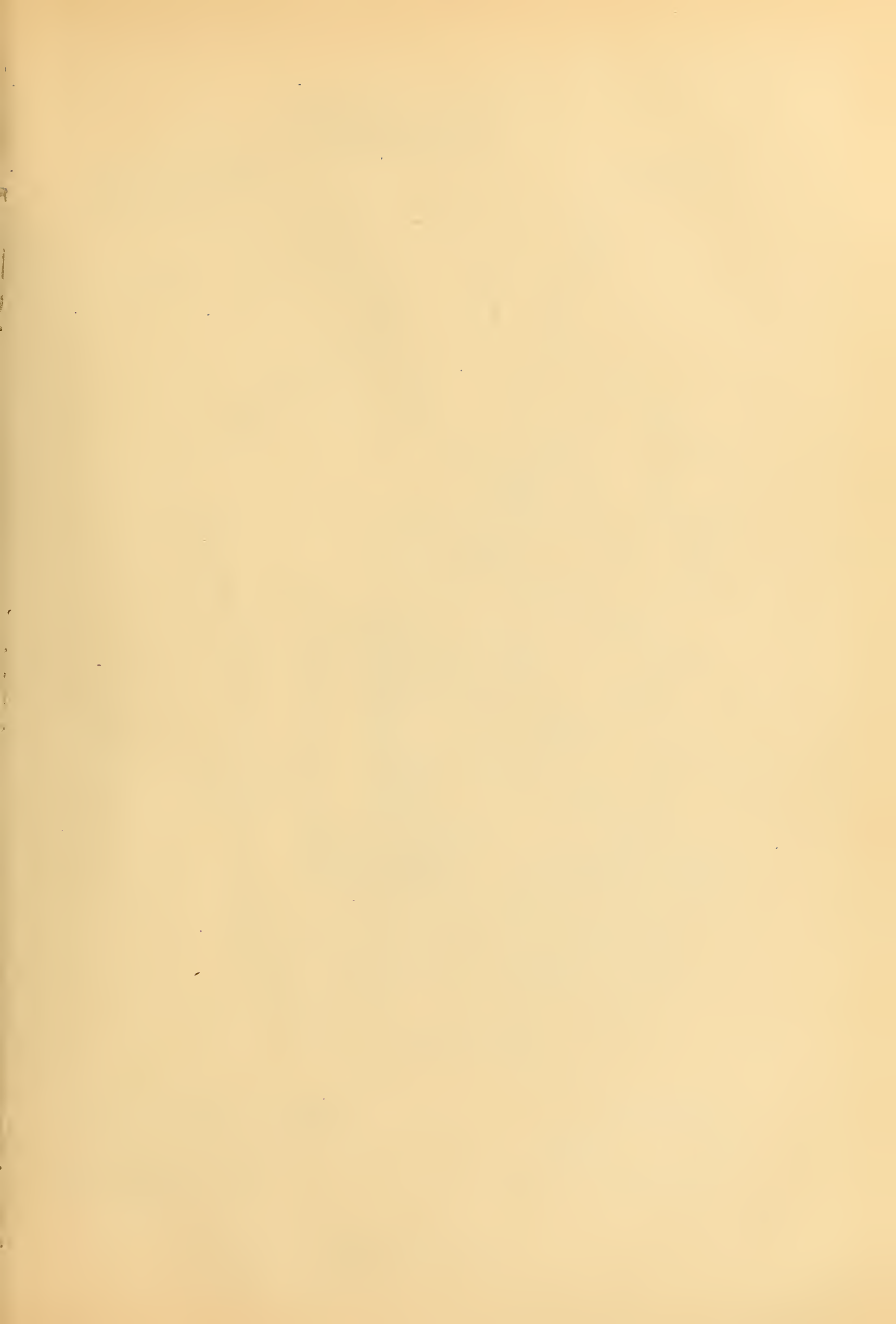
ALEX FISCHER.

Witnesses:

A. BROWNE,  
A. E. VIDAL.







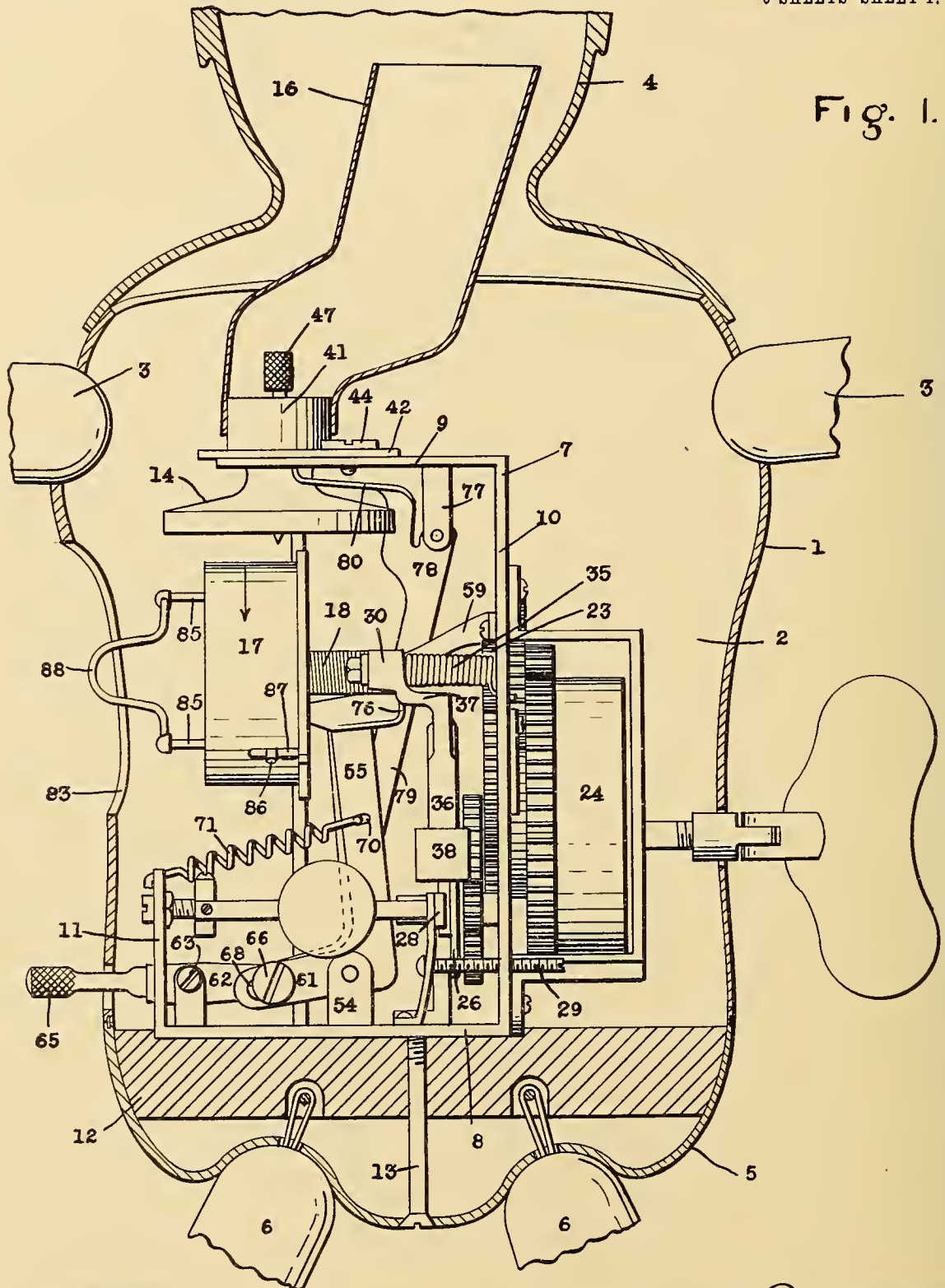
W. ROTTER & R. S. ARTHUR.  
 PHONOGRAPHIC DOLL.  
 APPLICATION FILED JUNE 19, 1913.

1,097,771.

Patented May 26, 1914.

6 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:  
 Howard R. King.  
 Mildred E. Brooks

INVENTORS:  
 William Rotter  
 and Richard S. Arthur  
 BY  
 Russell M. Everett,  
 ATTORNEY.





W. ROTTER & R. S. ARTHUR.  
 PHONOGRAPHIC DOLL.  
 APPLICATION FILED JUNE 19, 1913.

1,097,771.

Patented May 26, 1914.

6 SHEETS—SHEET 2.

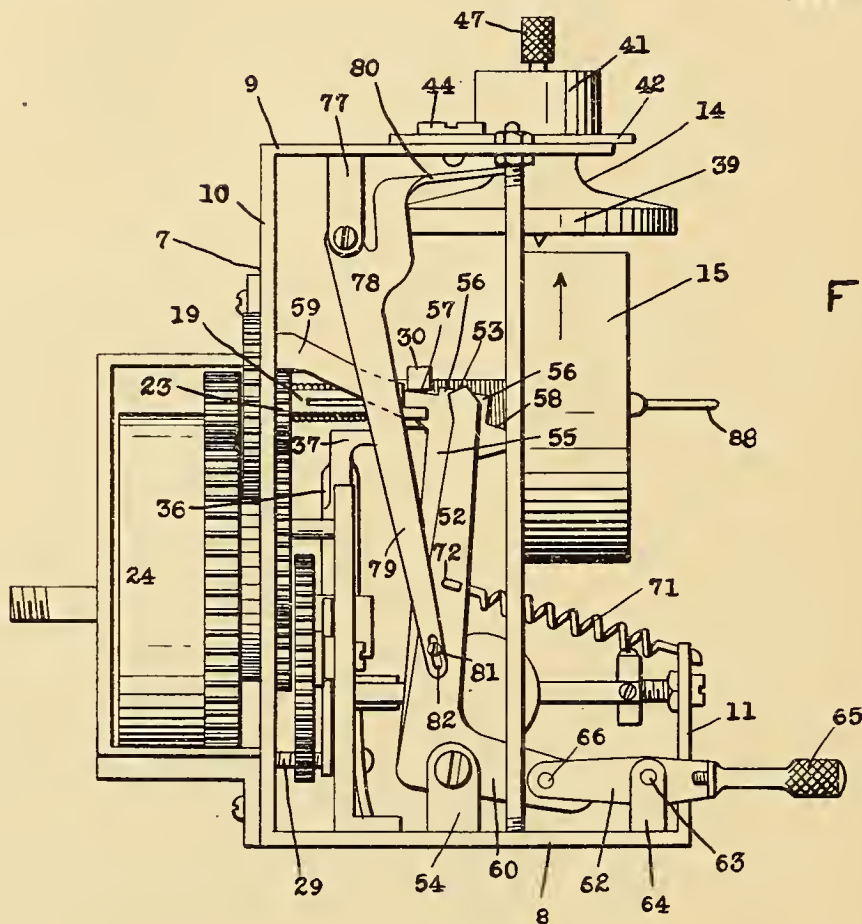


Fig. 2.

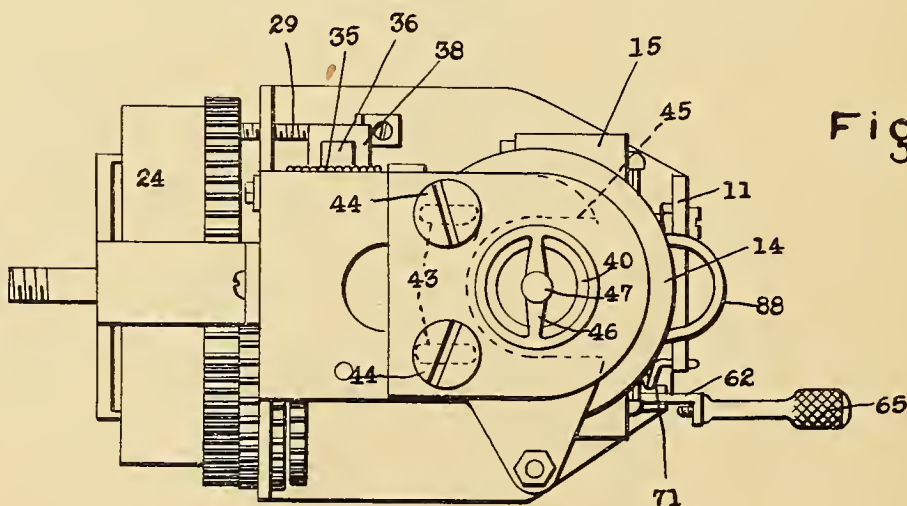


Fig. 3.

WITNESSES:  
*Howard H. King.*  
*Mildred E. Brooks*

INVENTORS:  
*William Rotter*  
*and Richard S. Arthur,*  
 BY  
*Russell M. Everett,*  
 ATTORNEY.





W. ROTTER & R. S. ARTHUR.  
 PHONOGRAPHIC DOLL.  
 APPLICATION FILED JUNE 19, 1913.

1,097,771.

Patented May 26, 1914.  
 6 SHEETS—SHEET 3.

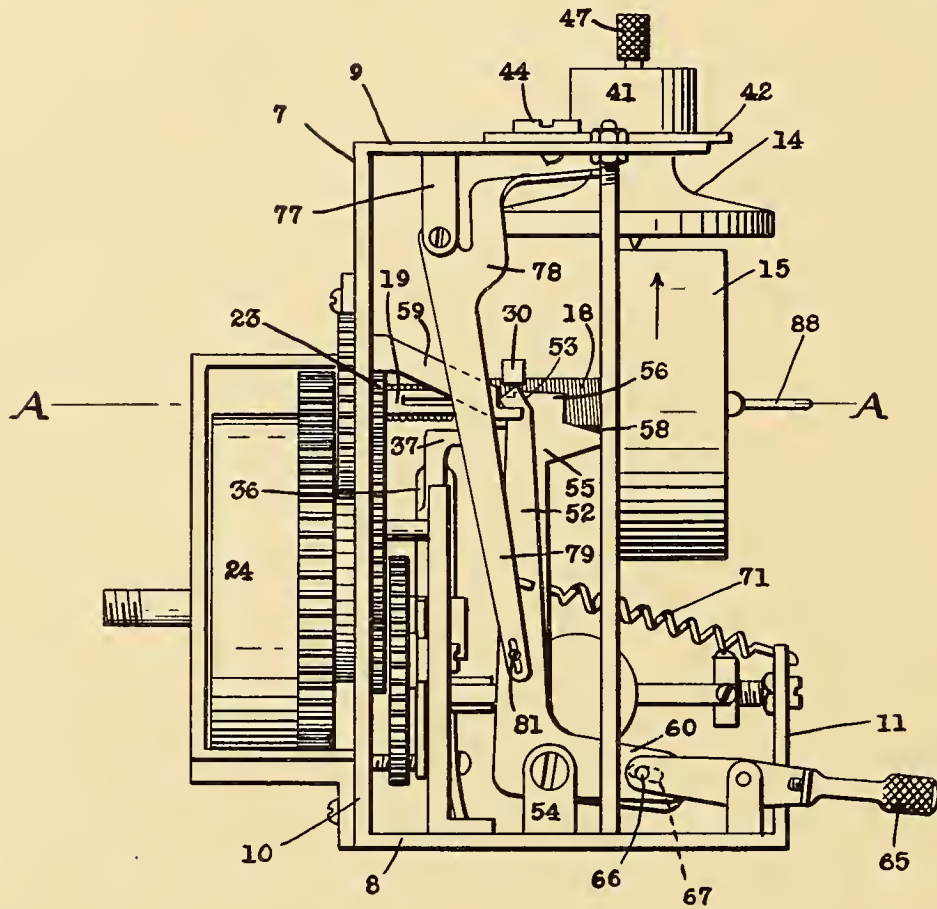


Fig. 4.

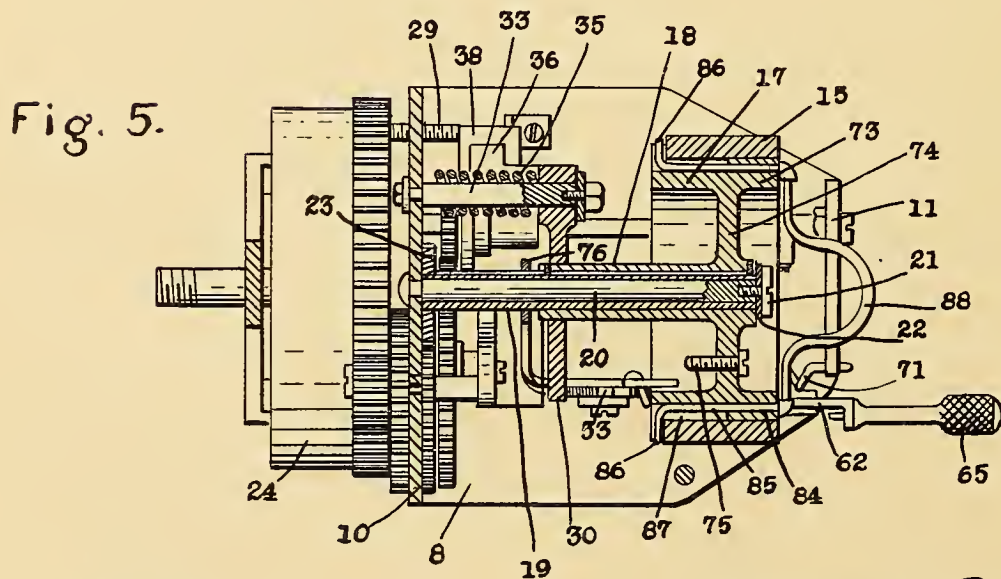


Fig. 5.

WITNESSES:  
 Howard A. King.  
 Mildred E. Brooks

INVENTORS:  
 William Rotter  
 and Richard S. Arthur,  
 BY  
 Russell M. Everett.  
 ATTORNEY.



W. ROTTER & R. S. ARTHUR.  
 PHONOGRAPHIC DOLL.  
 APPLICATION FILED JUNE 19, 1913.

1,097,771.

Patented May 26, 1914.

6 SHEETS—SHEET 4.

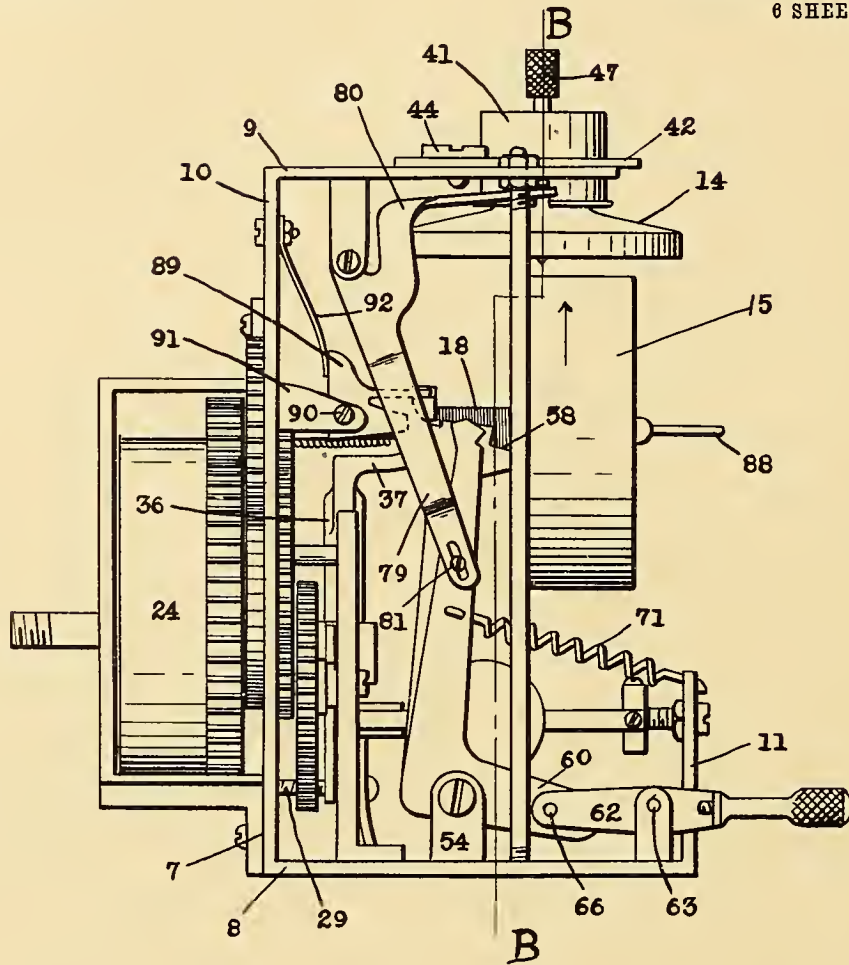


Fig. 6.

Fig. 10.

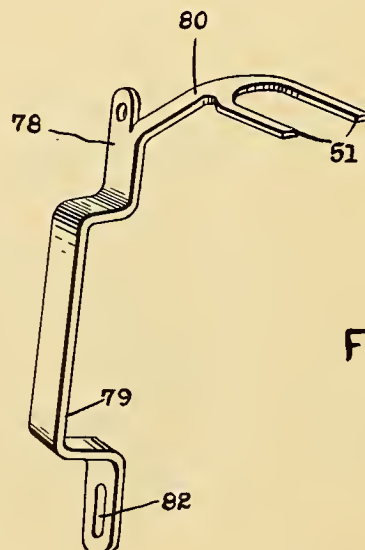
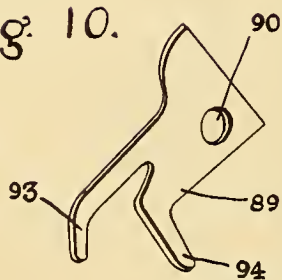


Fig. 11.

WITNESSES:

*Howard A. King.*  
*Mildred E. Brooks*

INVENTORS:

*William Rotter*  
*and Richard S. Arthur,*  
 BY  
*Russell W. Everett*  
 ATTORNEY.





W. ROTTER & R. S. ARTHUR.  
 PHONOGRAPHIC DOLL.  
 APPLICATION FILED JUNE 19, 1913.

1,097,771.

Patented May 26, 1914.

6 SHEETS—SHEET 5.

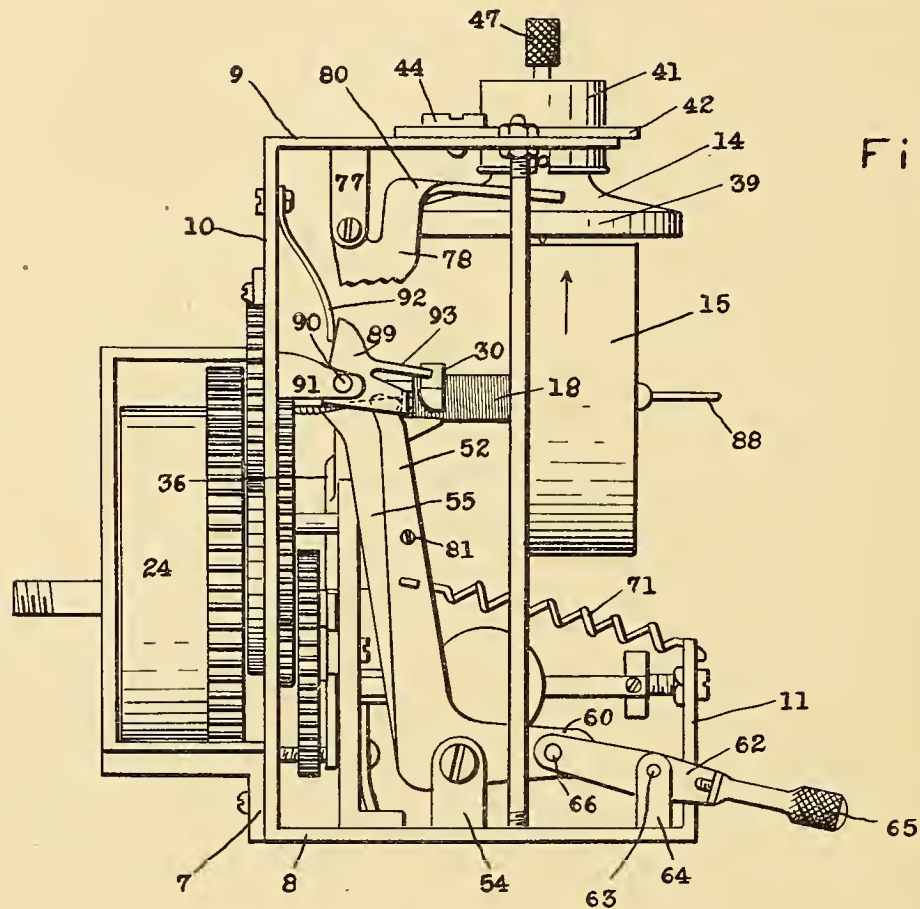


Fig. 7.

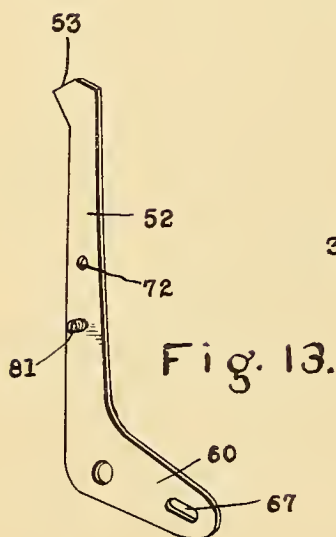


Fig. 13.

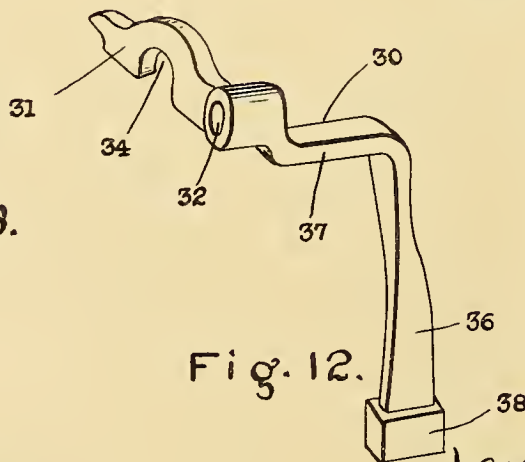


Fig. 12.

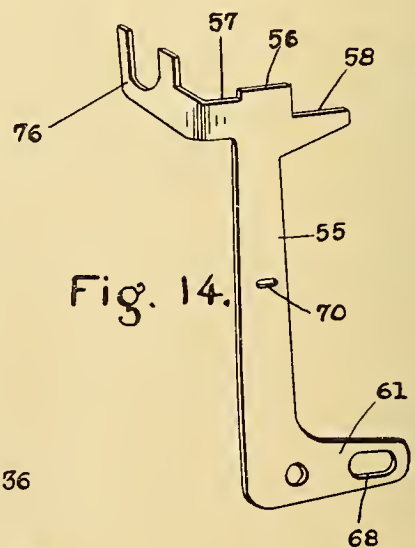


Fig. 14.

WITNESSES:

*Howard A. King.*  
*Mildred E. Brooks*

INVENTORS:

*William Rotter*  
*and Richard S. Arthur,*  
*Russell W. Everett,*  
 ATTORNEY.





W. ROTTER & R. S. ARTHUR.  
 PHONOGRAPHIC DOLL.  
 APPLICATION FILED JUNE 19, 1913.

1,097,771.

Patented May 26, 1914.

6 SHEETS—SHEET 6.

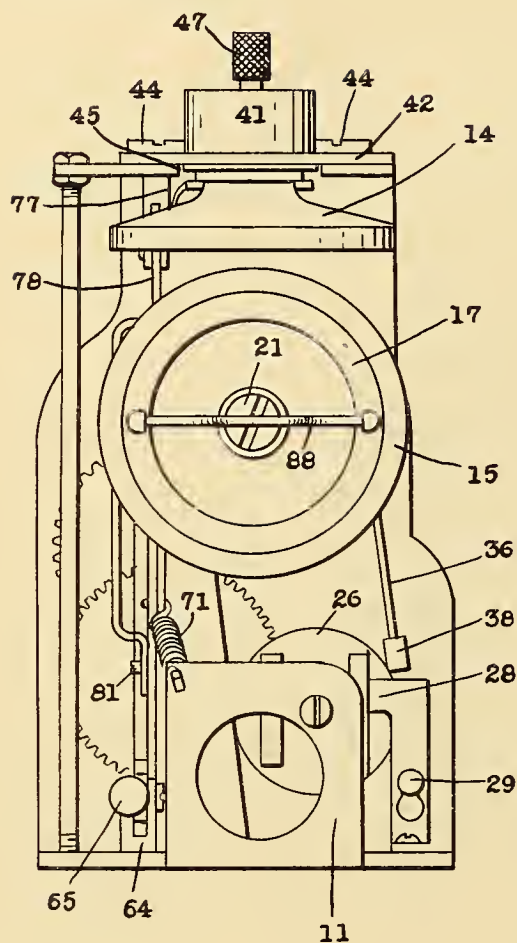


Fig. 8.

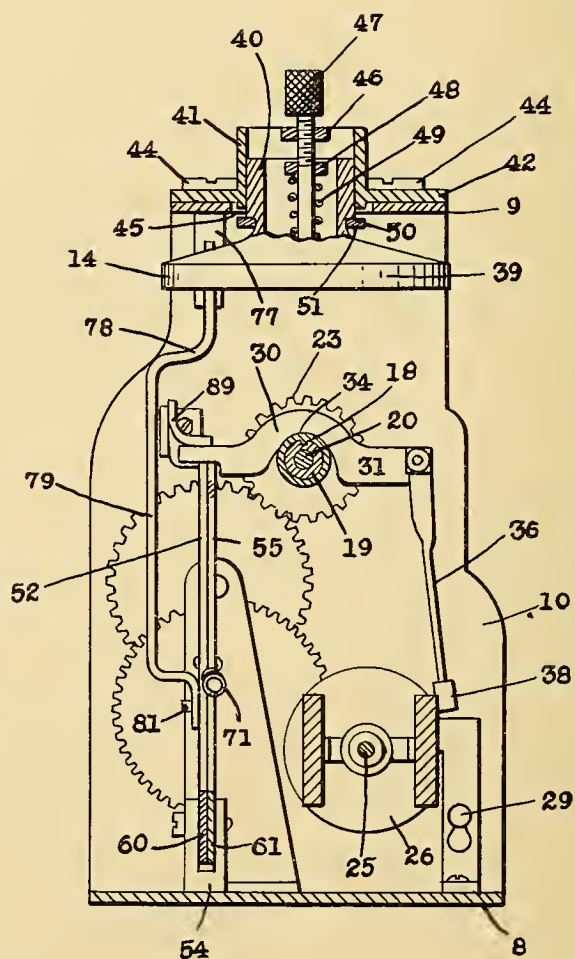


Fig. 9.

WITNESSES:  
 Howard B. King.  
 Mildred E. Brooks

William Rotter INVENTORS:  
 and Richard S. Arthur,  
 BY  
 Russell W. Everett,  
 ATTORNEY.

# UNITED STATES PATENT OFFICE.

WILLIAM ROTTER AND RICHARD S. ARTHUR, OF NEWARK, NEW JERSEY; SAID  
ARTHUR ASSIGNOR TO SAID ROTTER.

## PHONOGRAPHIC DOLL.

1,097,771.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed June 19, 1913. Serial No. 774,509.

*To all whom it may concern:*

Be it known that we, WILLIAM ROTTER and RICHARD S. ARTHUR, citizens of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain Improvements in Phonographic Dolls, of which the following is a specification.

The objects of this invention are to provide a doll in which sound reproducing apparatus is arranged so that the doll will appear to talk; to obtain the issuance of sound from the proper part of the doll's body; to enable the sound reproducing apparatus to be conveniently operated and controlled, and records to be readily and easily changed; to arrange the parts of the apparatus so that they will not be easily tampered with; to provide means for retaining the record drum in idle position to receive the thrust required to insert a record; to provide improved means for releasing the feed nut from the thread bar when the record has been played; to provide improved means for returning the record to its initial position after having been played and the feed nut removed; to provide means for positively removing the sapphire from the record during the return of the record to initial position; to maintain the feed nut in true relation to the thread bar; to secure simplicity of construction and operation, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views. Figure 1 is a central sectional view through a doll, looking from the back toward the front of the same, and showing our improved mechanism mounted therein; Fig. 2 is a view of said mechanism from the front with the doll body removed; Fig. 3 is a top view of the same; Fig. 4 is a view similar to Fig. 2, showing the operating lever partly depressed; Fig. 5 is a sectional view on line A—A of Fig. 4 looking down; Fig. 6 is a view similar to Fig. 2 showing a modified construction with a detent for holding certain levers while the record is being played; Fig. 7 is a similar view showing said levers engaged by the detent; Fig. 8 is an elevation looking from the right hand side of Fig. 6; Fig. 9 is a vertical sectional view taken on line B—B of Fig. 6; Fig. 10 is a perspective

view of the detent for retaining said levers; Fig. 11 is a perspective view of the arm for raising the reproducer; Fig. 12 is a perspective view of the feed nut and its attached brake; Fig. 13 is a perspective view of a certain raising lever, and Fig. 14 is a similar perspective view of a locking lever.

In the specific embodiment of the invention illustrated in said drawings, the reference numeral 1 indicates the torso or body of a doll, made up of an upper section 2 carrying the arms 3, 3 and head 4, and a lower section 5 carrying the legs 6, 6, said sections being secured together in any desired or well-known manner. Within the said torso or body 1 is a strap metal frame 7 for carrying the various mechanisms hereinafter described, said frame comprising a bottom plate 8, a top plate 9 substantially parallel to the bottom plate and a connecting side piece 10 preferably perpendicular to the top and bottom plates. From the free end of the bottom plate 8 an extension 11 is turned upward for a short distance substantially parallel to the side piece 10 for purposes hereinafter described. Said frame is supported in upright position within the upper section 2 of the doll body upon a bed or filler block 12 in the lower section 5, a screw 13 being shown introduced centrally upward from the bottom of the lower section through the filler and screwing into the bottom plate 8 of the frame to clamp the several parts together. Any suitable means may be employed to prevent twisting of the frame on the filler, but as here shown said filler is recessed to receive the bottom plate of the frame.

The phonographic reproduction of sound is obtained by a reproducer 14 on the top plate 9 coacting with a cylindrical record 15 therebeneath, and in order to issue the sound from the head 4 of the doll a horn 16 extends upward from the reproducer through the neck of the doll into the head. Said cylindrical record 15 is frictionally held upon a drum 17 fixed on a thread-bar 18 slidably splined on a rotatable spindle 19. It is to be understood that said spindle is mounted intermediate of and substantially parallel to the upper and lower plates of the frame and extends from side to side of the doll. For so mounting the spindle, an axle 20 is riveted or otherwise firmly secured to the side piece 10 to project in-



wardly of the frame, and extend longitudinally through the spindle. The axle 20 is preferably the same length as the spindle and is suitably recessed at its free or outer end to receive a screw 21, the head of which, together with an interposed washer 22, overlies the end of said spindle to prevent longitudinal displacement thereof. A gear-wheel 23 fast on the spindle 19 at its end adjacent the side piece of the frame, receives its rotary movement through a suitable train of gearing from a spring shown within a casing 24 as is usual and customary in the art. This train of gearing preferably includes a governor comprising a rotating governor shaft 25 carrying a friction disk 26 adapted to be slid by the centrifugal action of weights as is usual in governors of the centrifugal expanding type. As the governor shaft 25 gains speed the friction disk 26 is thus brought into contact with a brake 28 supported from the bottom plate 8 of the frame and which is held in adjustable relation to the normal position of the friction disk by means of a screw 29 from the side piece 10 of the frame. An approximately constant speed of rotation of the record is therefore provided, the rate of which can be adjusted as desired.

The feed nut 30 (see Figs. 5, 9 and 12) to coact with the thread bar 18 to advance the record, consists of an arm 31 projecting forwardly across the thread bar from a rod 33 on which said arm is pivotally mounted, as by a transverse hole 32 through itself. Said arm is also hollowed or recessed at its under side intermediate of its ends, as at 34, and threaded for said hollowed or recessed portion so that as the arm rests on the rotating thread bar 18 said bar is fed longitudinally as desired. The pivot rod 33 carrying the feed nut is shown affixed to the side piece 10 of the frame projecting inwardly therefrom substantially on a level with and parallel to the thread bar, and carrying upon itself a spiral spring 35 fastened at its one end to the side piece and resting upon the feed nut 30 at its other end to exert a constant depressing force thereon. A depending brake arm 36 secured to the feed nut at its pivoted end by an offset 37 carries at its lower end a brake 38 adapted to engage the periphery of the friction disk 26 of the governor when the feed nut is raised, thereby stopping the rotation of the several parts.

During the rotation and consequent advancement of the record as above described, the reproducer 14 above referred to engages the same to produce the sound. This reproducer comprises a circular head 39 tapering upwardly inward from its peripheral edge to an upwardly projecting neck 40 integral therewith. Said neck 40 is slidably mounted in a collar 41 carried by the top plate 9 of the frame 7 said collar being integral with

or secured to an auxiliary plate 42 having slots 43, 43 through which extend clamping screws 44, 44 for adjustably securing said auxiliary plate 42 to the top plate. The neck 40 of the reproducer depends from the collar 41 through an enlarged slot 45 in the top plate, said slot being open at the free end of said top plate so that the auxiliary plate 42 may be removed with the reproducer. By virtue of this enlarged slot 45 and the screw slots 43 it will be obvious that the reproducer may be adjusted to any desired position.

Extending diametrically across the upper end of the collar 41 slidably supporting the reproducer is a bridge or plate 46 having at its center a tension adjusting screw 47 depending axially coincident into the collar 41 and provided with an annular lateral flange or shoulder 48 adjacent its lower end against which abuts a spring 49 for adjusting the tension on the diaphragm (not shown) within the reproducer. The neck 40 of the reproducer is provided with an undercut recess 50 into which fit fingers or ends of a yoke 51 for raising the reproducer as will be hereinafter described.

For controlling the feed nut 30 to raise or lower the same whereby the brake 38 is simultaneously applied or released, we provide a raising lever 52 having a tapered upper end 53 and pivoted in a bracket 54 on the bottom plate 8 of the frame to swing transversely to the arm 31 of the feed nut 30. A locking lever 55 is shown mounted upon the same fulcrum as the raising lever and beside the same, said locking lever being provided with a stepped upper end having a middle elevation 56 over which the feed nut must be raised to place the same in its operative position from the inoperative position or vice versa. A relatively shallow recess 57 is provided at the side of this elevation 56 away from the record, in which the feed nut may rest and be maintained thereby out of engagement with the thread bar. On the opposite side of the elevation 56, or the side toward the record, is provided a relatively deep recess 58 so that the feed nut may drop lower and engage the threads of the feed bar. As it is desirable to support the outer end of the feed nut, when in such lowered position so that its threads mesh with those of the feed bar, without excessive pressure due to its depressing spring 35, and as it is not practicable to obtain sufficient precision in the step on the locking lever to do this, we provide a rest 59 projecting from the side piece 10 of the frame and sufficiently rigid to accurately do this. Because of the middle elevation 56 on the locking lever 55 it is impossible to swing said locking lever from either of its extreme positions until the feed nut has been lifted over said elevation. As shown in Fig. 130



2, the feed nut is in the shallow recess 57 of this locking lever, and in order to get it into the other or deeper recess 58 the raising lever 52 is first swung as shown in Fig. 4, it being noted that the engagement of the tapered end 53 of said raising lever lifts the feed nut above the elevation of the locking lever so that said locking lever can swing away from the record. For so operating the two levers 52 and 55, they have lower bell-crank arms 60, 61, respectively, arranged side by side in the planes of the levers. A controlling lever 62 pivoted as at 63 to a bracket 64 on the bottom plate 8 of the frame has a finger piece 65 at its outer end and has its inner end at one side of said arms 60, 61, substantially parallel thereto and closely adjacent to them. A transverse screw 66 or the like in said inner end of the controlling lever extends through and engages the sides of a slot 67 in the raising lever arm 60, (see Fig. 4), and also projects through a wider slot 68 in the locking lever arm 61, (see Fig. 1), so that an initial movement of the controlling lever is not transmitted immediately to said last-mentioned arm 61. A transverse slot 70 is also provided in the upright main portion of the locking lever 55 through which extends the end of a spiral tension spring 71 said end hooking also through a registering hole 72 in the raising lever which it fits more closely, whereby both of said levers are normally drawn toward the record and yet they can swing independently to a limited extent, see Figs. 1 and 2.

The drum 17 for holding the record preferably provides a rim 73 and a radial web 74 from which projects a trip 75, here shown as a screw, although any equivalent could be used. As the drum is rotated and advanced it approaches the feed nut, and by the time the record is played said trip 75 engages under the feed nut and raises the same, releasing the locking lever, whereupon the tension in the spring 71 draws both levers toward the record into the position shown in Fig. 1. Simultaneously with this movement of the levers the drum 15 and record are returned to initial position and to do this the locking lever is provided at its top with a fork 76 slidably straddling the drum-carrying spindle 19 and adapted to engage flatwise against the inner end of the thread-bar 18, so that when the lever is drawn over by the spring said thread-bar, with the attached drum, is slid outward or back to initial position. As the feed nut prevents movement of the locking lever after entering the shallow recess 57 thereof, the thread-bar and drum are consequently prevented from sliding back after being slid to initial position.

Simultaneous with the return of the record to initial position it is desirable to raise the

reproducer from off the record. To this end we pivot in a depending bracket 77 from the top plate 9 of the frame, a bell-crank lever 78 with one arm 79 thereof extending downward and the other arm 80 extending toward the reproducer and carrying the yoke 51 previously referred to the fingers of which engage in the undercut recess 50 of the reproducer. Obviously by swinging the bell-crank lever 78 the reproducer may be raised or lowered, and we thus operate said bell-crank lever by a pin 81 on the raising lever 52 entering a slot 82 at the lower end of the bell-crank arm 79, so that as the raising lever 52 is swung away from the record and the record starts to rotate, the reproducer is lowered with its stylus in engagement with the record. When the levers and the record are returned at the end of the reproduction the bell-crank 78 raises the reproducer out of engagement with the record.

In order to provide means whereby the record may be drawn off the drum and removed through a small aperture 83 in the side of the drum, we bore suitable diametrically opposite holes 84 in the rim of the drum through which extend wires or hooks 85 having their inner ends 86, 86 extending radially of the drum outward from the center to overlie the end of the record, as shown in Fig. 5. Suitable outwardly open slots 87, 87 expose the holes 84, 84 part way across the drum, in which the hooked ends 86 may travel, and a bail 88 is secured to the outer ends of the wires 85 by which they may be pulled simultaneously. The hooked ends 86, 86 engaging the edge of the record will obviously draw the record off the drum as far as the slots 87 will allow the wires to be pulled and it can then be grasped and readily withdrawn by the fingers of the operator.

In Figs. 6 to 10, inclusive, we have shown a catch or detent 89 behind which the raising lever 52 and locking lever 55 may be caught, and held when the reproduction of sound takes place, instead of held by the feed nut as heretofore described. Said catch is pivoted as at 90 to a bracket 91 on the side piece 10 of the frame and is held normally depressed by a spring 92 here shown as a leaf spring secured to said side piece, an upper finger 93 of the catch resting on top of the feed nut. A lower finger 94 lies in the path of the raising lever 52 and the locking lever 55, so that when they are swung they catch behind said lower finger 94 and are held by it. When the feed nut is raised by the trip 75 on the drum, the upper finger 93 of the catch, overlying the feed nut, will cause the catch to be raised also and its lower finger 94 freed from the levers 52, 55 to allow them to return to initial position.

One of the leading features of our im-



proved construction is that the threaded feed bar carrying the record drum extends only one side of said drum, so that records can be readily removed and put onto said drum from its other side. Because of this, the side or end of the drum away from the side piece 10 of the frame is fully exposed, the frame being discontinued below and above the drum as clearly shown in the drawings. Removal and replacing of records with respect to the drum is therefore greatly facilitated, and at the same time the action of the mechanism is not impaired, because of the long bearing afforded by the hollow feed bar upon the spindle beneath. Furthermore, perfect rotation of the drum is secured from the spindle at the same time it is permitted to slide on said spindle, by means of the slot and key connection between said parts. Obviously, a single slot or a plurality of them may be employed, and the key may vary in form, or other suitable equivalents suggesting themselves to those skilled in the art may be employed.

Another leading feature of our construction is the use of the raising lever and locking lever together with means for operating these by a single controlling lever, and through them operating other parts such as the brake and reproducer lifter. It will be understood that various detail changes could be made in the construction and operation of these parts without departing from the spirit and scope of our invention. In fact we do not wish to be understood as limiting ourselves by any of the positive descriptive matter employed herein to illustrate our invention and intend the following claims to be construed as broadly as the state of the art will permit.

Having thus described the invention, what we claim is:—

1. In a sound reproducing mechanism, the combination of a fixed axle having a free projecting end, a tubular spindle on said axle, an exteriorly threaded tubular feed bar slidably keyed to said spindle, a drum on said feed bar, means for releasably retaining said spindle on said axle, and means for rotating said spindle.

2. In a sound reproducing mechanism, the combination of a fixed axle, a tubular spindle rotatably mounted on said axle, a feed bar slidably keyed to said spindle, a drum on said feed bar, and means for actuating said spindle and feed bar.

3. In a sound reproducing mechanism, the combination of a spindle having a free projecting end, means for holding said spindle against longitudinal movement, means for rotating said spindle, a drum rotatably fast on said spindle, means between said drum and the supported end of the spindle for sliding said drum longitudinally on the spindle, and means for holding said sliding

means out of engagement during rotation of said spindle.

4. In a sound reproducing mechanism, the combination with a threaded feed bar, of a feed nut pivoted to swing transversely of said feed bar, a spring normally holding said feed nut in engagement with the feed bar, a drum on said feed bar, a trip on said drum adapted to disengage the feed nut, means for automatically locking said feed nut in disengaged position, and means for releasing said locking means.

5. In a sound reproducing mechanism, the combination of a motor, a brake wheel, and a threaded feed bar adapted to be driven by said motor, of a member pivoted to swing transversely of said feed bar forming at one end a feed nut to engage said feed bar and at its other end having a brake to engage said brake wheel, a spring normally holding said feed nut in engagement with the feed bar and said brake disengaged from the brake wheel, means for automatically disengaging said feed nut and engaging the brake, and means for releasing said parts.

6. In a sound reproducing mechanism, the combination with a threaded feed bar, of a feed nut normally engaging said feed bar, a spring controlled locking lever adapted to automatically hold said feed nut in released position, a detent for holding said lever out of engagement with the feed nut, means rotated by the feed bar for automatically releasing the feed nut and detent, and means for swinging the locking lever to again engage the feed nut with the feed bar.

7. In a sound reproducing mechanism, the combination of a threaded feed bar, a feed nut normally engaging said feed bar, means for automatically releasing said feed nut from the feed bar, a locking lever having a stepped end adapted to lock with the feed nut either engaged with or released from the feed bar, a raising lever adapted to release the locking lever, and a single controlling lever for operating both said locking lever and raising lever.

8. In a sound reproducing mechanism, the combination of a threaded feed bar, a feed nut normally engaging said feed bar, means for automatically releasing said feed nut from the feed bar, a locking lever for holding said nut released, a raising lever for releasing said locking lever whereby it may be swung to allow the feed nut to engage the feed bar, and a controlling lever for operating both said locking lever and raising lever.

9. In a sound reproducing mechanism, the combination with a threaded feed bar, a feed nut normally engaging said feed bar, means for automatically releasing said feed nut from the feed bar, a bell-crank locking lever for holding said nut released, a bell-

crank raising lever at the side of said locking lever for releasing the same whereby said levers may be swung to allow the feed nut to engage the feed bar, said locking lever and raising lever having operating arms arranged side by side, and a controlling lever connected to said operating arms of said locking and raising levers away from their arms next the feed nut.

10 10. In a sound reproducing mechanism, the combination with a threaded feed bar, a feed nut normally engaging said feed bar, means for automatically releasing said feed nut from the feed bar, a locking lever for holding said feed nut released from the feed bar, a raising lever upon the same fulcrum with said locking lever and adapted to release the same whereby said levers may be swung to admit engagement of the feed nut with the feed bar, a controlling lever, and a connecting pin extending through said controlling lever and locking and raising levers, said pin having more lost motion with respect to one of said last-mentioned levers than the other.

11. In a sound reproducing mechanism, the combination with a threaded feed bar, a feed nut normally engaging said feed bar, means for automatically releasing said feed nut from the feed bar, a locking lever for holding said feed nut released from the feed bar, a raising lever upon the same fulcrum with said locking lever and adapted to release the same whereby said locking lever may be swung to admit engagement of the feed nut with the feed bar, a controlling lever, a connecting pin extending through said controlling lever and locking and raising levers, said pin having more lost motion with respect to one of said last-mentioned levers than the other, and a spring for holding said levers in normal position, the same lever which has more lost motion with re-

spect to the controlling lever having also more lost motion with respect to said spring. 45

12. In a sound reproducing mechanism, the combination with a threaded feed bar, of a feed nut normally engaging said feed bar, means for automatically releasing said feed nut, means for automatically locking said feed nut in released position, a raising lever for disengaging said locking lever, and means operated by the movement of said levers for raising and lowering the reproducer with respect to the record. 55

13. In a sound reproducing mechanism, the combination of a threaded feed bar adapted to slide longitudinally of itself, a feed nut held against movement longitudinally of said feed bar, means for yieldingly holding said feed nut in engagement with said feed bar, a raising lever for lifting said feed nut away from said feed bar, a locking lever for holding said feed nut raised, and a controlling lever for operating both said raising lever and locking lever. 65

14. In a sound reproducing mechanism, the combination of a threaded feed bar adapted to slide longitudinally of itself, a feed nut held against movement longitudinally of said feed bar, means for yieldingly holding said feed nut in engagement with said feed bar, a raising lever for lifting said feed nut away from said feed bar, a locking lever for holding said feed nut raised, means for resiliently holding said levers in position to keep the feed nut away from the feed bar and means adapted by a single movement of itself to operate both said levers and engage the feed nut with the feed bar. 80

WILLIAM ROTTER.

RICHARD S. ARTHUR.

Witnesses:

HOWARD P. KING,

JANET A. AYERS.



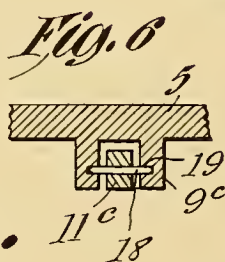
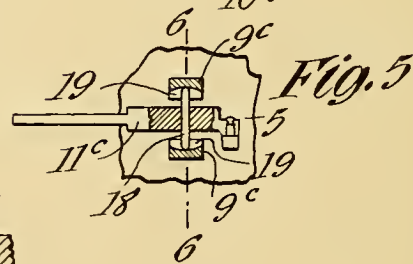
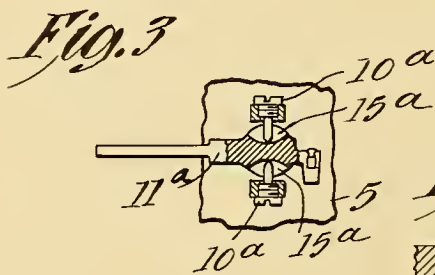
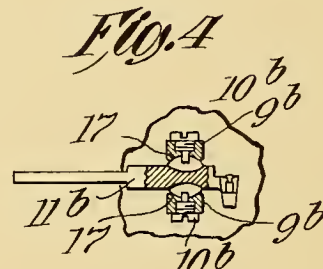
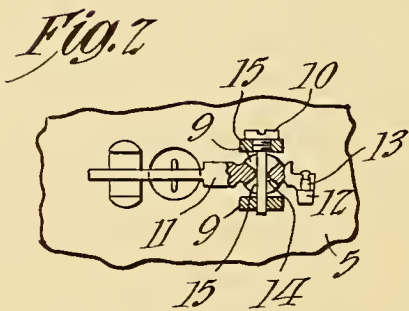
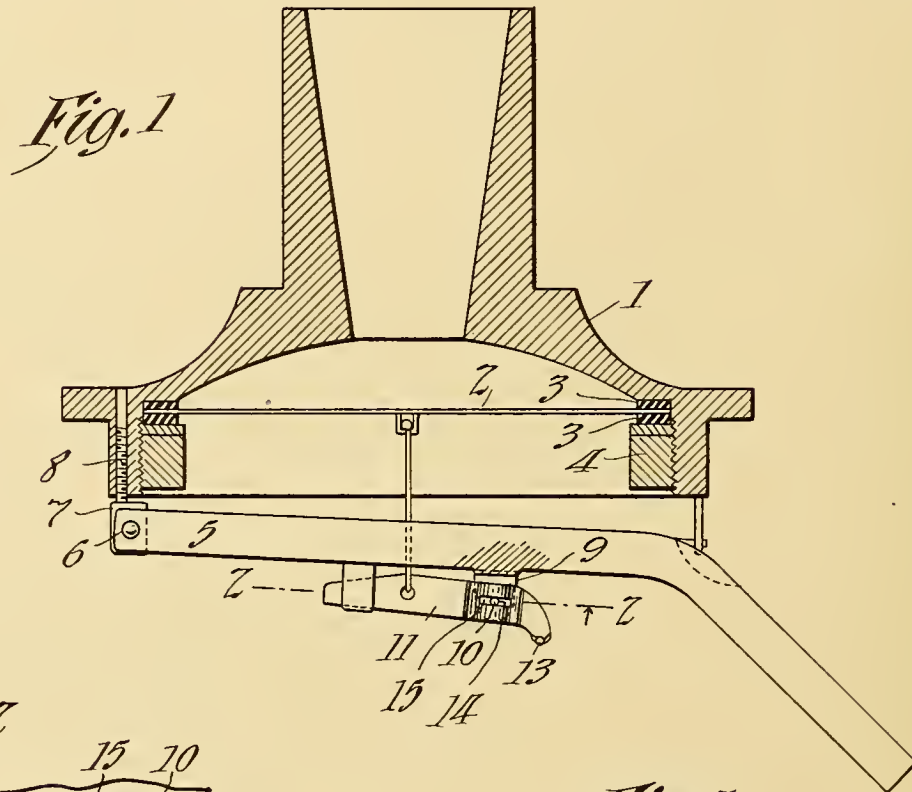




A. F. GALL.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED SEPT. 11, 1909.

1,097,972.

Patented May 26, 1914.



*Witnesses:*  
 Frank D. Lewis  
 Delos Holden

*Inventor:*  
 Adolph F. Gall  
 by Frank L. Dyer  
 His Atty.



# UNITED STATES PATENT OFFICE.

ADOLPH F. GALL, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-REPRODUCER.

1,097,972.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed September 11, 1909. Serial No. 517,336.

*To all whom it may concern:*

Be it known that I, ADOLPH F. GALL, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have made certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers of the Edison type in which a floating weight is pivoted to the body of the reproducer, and the stylus is carried by a lever pivoted to the floating weight, and connected to a reproducer diaphragm or other means for producing sound vibrations.

My invention has for its object the mounting of the said lever in such a way that the stylus shall be free to move up and down and also horizontally or laterally, but which mounting will not permit the stylus lever to move longitudinally or to turn about a longitudinal axis, whereby the stylus responds very readily to irregularities in the record groove, is adapted to track a record groove having a pitch as small as one two-hundredth of an inch or less, and produces at all times a loud and clear reproduction.

Reference is hereby made to the accompanying drawing of which—

Figure 1 is a central vertical section of a phonograph reproducer constructed in accordance with my invention; Fig. 2 is a section on line 2—2 of Fig. 1; Figs. 3, 4 and 5 are similar views of modifications, and Fig. 6 is a section on line 6—6 of Fig. 5.

The reproducer shown comprises the usual body 1, within which the diaphragm 2 is clamped between gaskets 3 by means of the usual clamping nut 4. The floating weight 5 is pivoted at 6 to a block 7 having a shank 8 threaded within the body 1. The floating weight is provided with a pair of depending lugs 9 within one of which is threaded a horizontal headed pin or screw 10. Upon the latter is pivoted the stylus lever 11, one end of which is provided with a socket 12 within which is fixed a stylus 13 in proper position to engage the groove of the sound record. The pivot portion of the lever is of enlarged cross section and is apertured as shown at 14 to receive the pin 10. This aperture is circular, and of a diameter very slightly greater than that of the pin 10 whereby any appreciable longitudinal movement of the lever is prevented. The ma-

terial of the lever is cut away in the vicinity of the said aperture to form horizontally disposed V-shaped slots 15, the upper and lower surfaces of which are flat and the height of said slots is substantially the same as the diameter of that portion of the pin 10 which passes through the aperture 14.

The structure of Fig. 3 is similar to that of Figs. 1 and 2, but differs therefrom in that the lever 11<sup>a</sup> is not provided with any aperture at its pivot portion and there are a pair of pins or screws 10<sup>a</sup> situated opposite and in alinement with each other, the lever being formed with slots 15<sup>a</sup>, the height of which is substantially the same as the diameter of the pins 10<sup>a</sup>, longitudinal movement of the lever being prevented by reason of the engagement of the ends of the pins 10<sup>a</sup> with the inner surfaces of the slots 15<sup>a</sup>.

Fig. 4 differs from Fig. 3 in that the ends of the pins 10<sup>b</sup> do not engage the body of the lever 11<sup>b</sup>. In this structure the pivot portion of the lever is spherical and engages spherical recesses 17 formed in the lugs 9<sup>b</sup>. The pins 10<sup>b</sup> are threaded in lugs 9<sup>b</sup> and engage in slots in the pivot portion of the lever, similar to slots 15<sup>a</sup> shown in Fig. 3.

In the structure of Figs. 5 and 6, the lever 11<sup>c</sup> is provided with a transverse pin 18 rigid therewith and which engages slots 19 formed in the lugs 9<sup>c</sup>, longitudinal movement of the lever being prevented by reason of the engagement of the ends of the pin 18 with the inner walls of said slots.

Having now described my invention, what I claim is:

1. In a phonograph reproducer, the combination of a body, a floating weight carried thereby, a horizontal pin carried by the floating weight in fixed relation thereto, and a stylus lever rotatable about said pin in two planes to permit the stylus to have up and down and lateral movement, said stylus lever being provided with means adapted to coact with said pin for restraining said lever against movement longitudinally thereof and against turning on a longitudinal axis, substantially as set forth.

2. In a phonograph reproducer, the combination of a body, a floating weight carried thereby, a horizontal pin carried by the floating weight, a stylus lever having a horizontal opening through which the pin passes and of substantially the same diameter as the pin, in a plane midway between the two

side surfaces, at which point the opening is circular in cross section, the opening being widened at each side of this point to form slots having horizontal bearing surfaces  
5 above and below the pin, substantially as set forth.

3. In a phonograph reproducer, the combination of a body, a diaphragm therein, a floating weight carried by said body, a  
10 horizontal pin carried by said weight, and a stylus lever pivotally mounted upon said pin and connected to said diaphragm, said lever having a horizontal opening there-  
15 through through which the pin passes, a portion of said opening of substantial length being of substantially the same height throughout as the diameter of the  
20 pin, said opening having a circular cross section in a plane midway between the two side surfaces of the lever, the opening extending to each side of said plane as a horizontal V-shaped slot having its apex in said plane, substantially as set forth.

4. In a phonograph reproducer, a stylus  
25 lever having a tapered horizontal slot formed therein and a horizontally arranged circular opening communicating with said slot and adapted to receive a pivot pin, a  
30 portion of said slot of substantial length being of substantially the same height throughout as the diameter of said pivot pin, substantially as set forth.

5. In a phonograph reproducer, a stylus  
35 lever having horizontal V-shaped slots on each side thereof with their apices inwardly directed and an opening connecting said slots situated at the apices thereof, said slots and opening being adapted to receive a pivot  
40 pin and being of substantially the same height throughout as the diameter of said pivot pin, substantially as set forth.

6. In a phonograph reproducer, the combination of a body, a floating weight carried thereby, a stylus, a stylus lever and a pivotal  
45 mounting therefor which comprises a pin and slot connection, said pin being rigidly mounted on said weight and forming a support for said lever, and said slot being so formed as to permit up and down and lateral  
50 movement of the stylus, but to restrain said lever against movement in a direction longitudinally thereof and against turning on a longitudinal axis, substantially as set forth.

7. In a phonograph reproducer, the combination of a body, a floating weight carried  
55 thereby, a stylus, a stylus lever, and a mounting providing for movement of the stylus lever with respect to the floating weight, said mounting comprising a pin and  
60 slot connection, said pin forming a support for said lever and said slot being so shaped as to permit up and down and lateral movement of the stylus but to restrain said lever against movement in a direction longitudi-  
65 nally thereof and against turning on a longitudinal axis, substantially as described.

8. In a phonograph reproducer, a stylus  
70 lever provided with a horizontal opening adapted to receive a pivot pin, said opening being so formed as to permit up and down and lateral movement of the stylus but to coact with said pivot pin to restrain said  
75 lever against movement in a direction longitudinally thereof and against turning on a longitudinal axis, substantially as described.

This specification signed and witnessed this 7th day of September, 1909.

ADOLPH F. GALL.

Witnesses:

DELOS HOLDEN,  
JOHN M. CANFIELD.





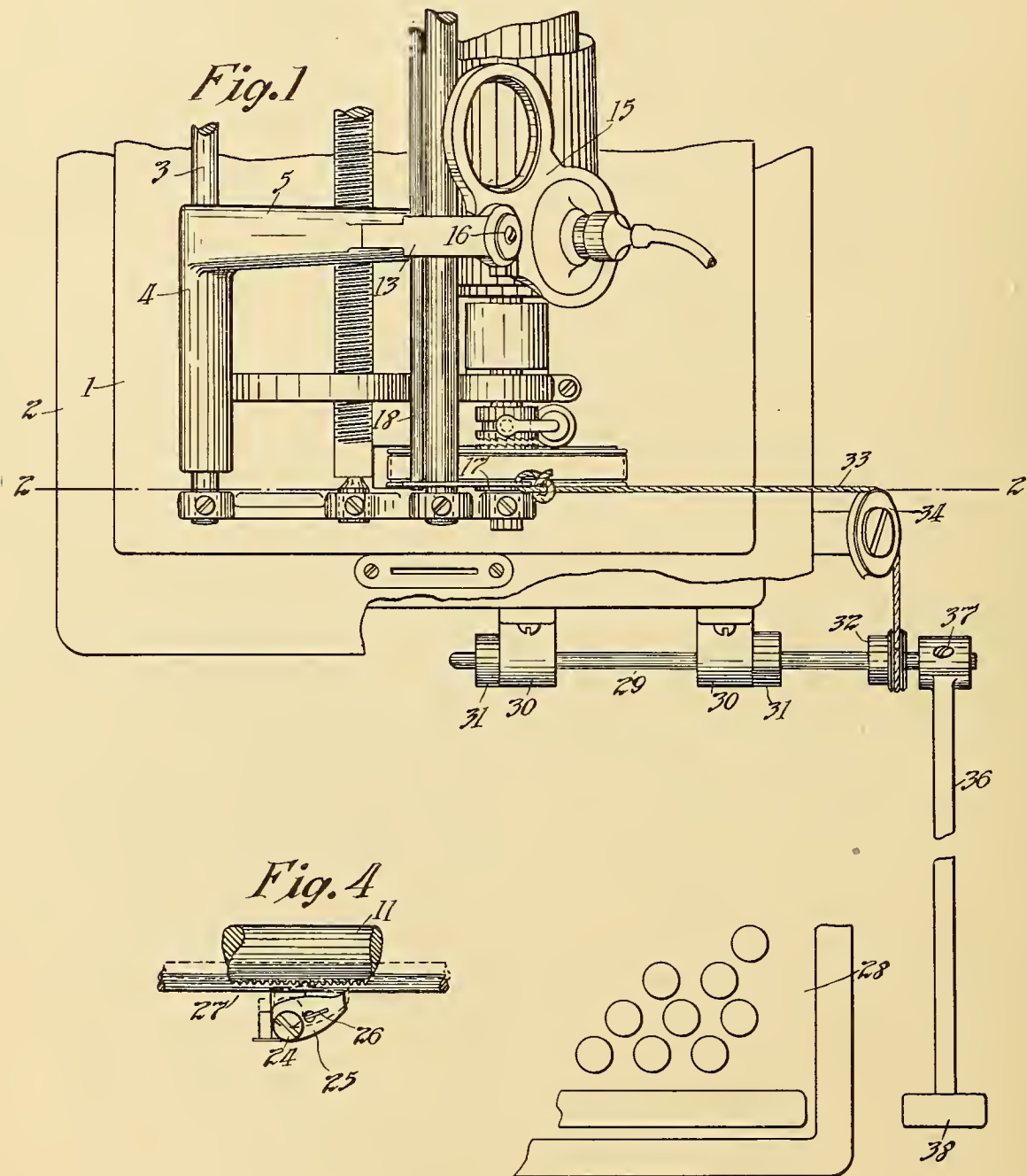


C. S. OSBORNE.  
 PHONOGRAPH.  
 APPLICATION FILED OCT. 6, 1911.

1,097,987.

Patented May 26, 1914.

3 SHEETS—SHEET 1.



*Witnesses:*  
*W. Dressler*  
*Frederick Dickmann*

*Inventor:*  
 Charles S. Osborne  
 by *Frank E. Soper*  
*His Atty.*

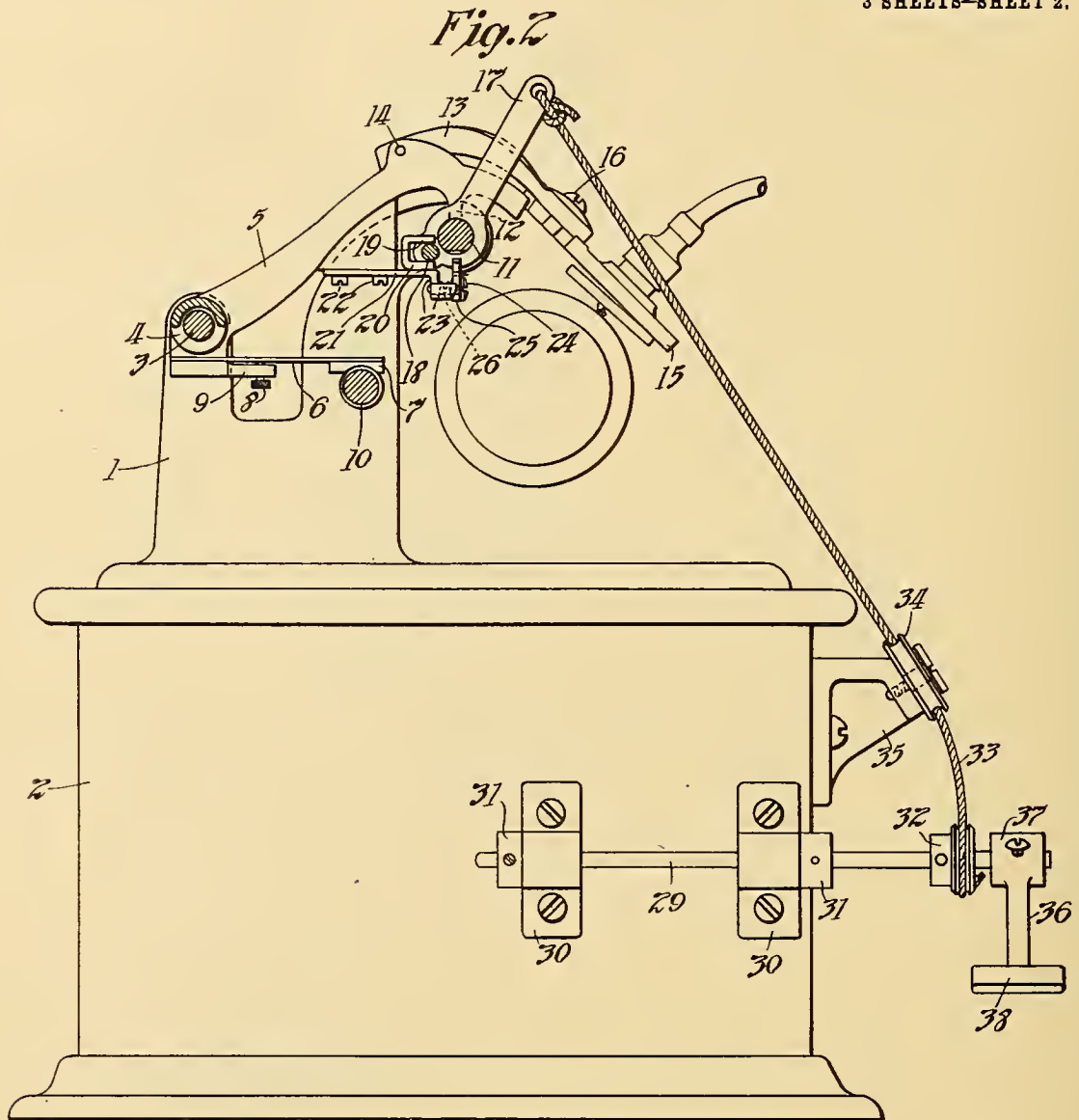


C. S. OSBORNE.  
 PHONOGRAPH.  
 APPLICATION FILED OCT. 6, 1911.

1,097,987.

Patented May 26, 1914.

3 SHEETS—SHEET 2.



*Witnesses:*

*Ed. Dressler*  
*Frederick Bachmann*

*Inventor:*

*Charles S. Osborne*  
*By Frank E. Ayer*  
*His Atty.*





C. S. OSBORNE.  
 PHONOGRAPH.  
 APPLICATION FILED OCT. 6, 1911.

1,097,987.

Patented May 26, 1914.

3 SHEETS—SHEET 3.

Fig. 5

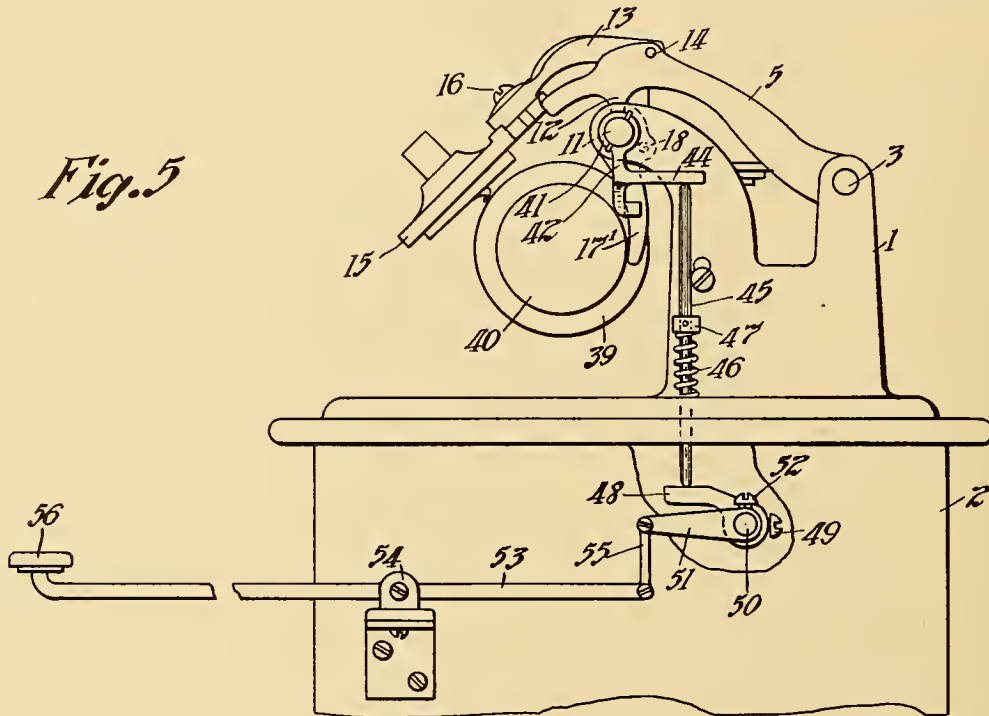


Fig. 6

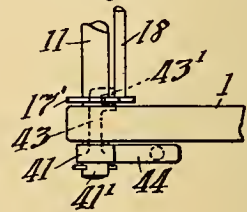
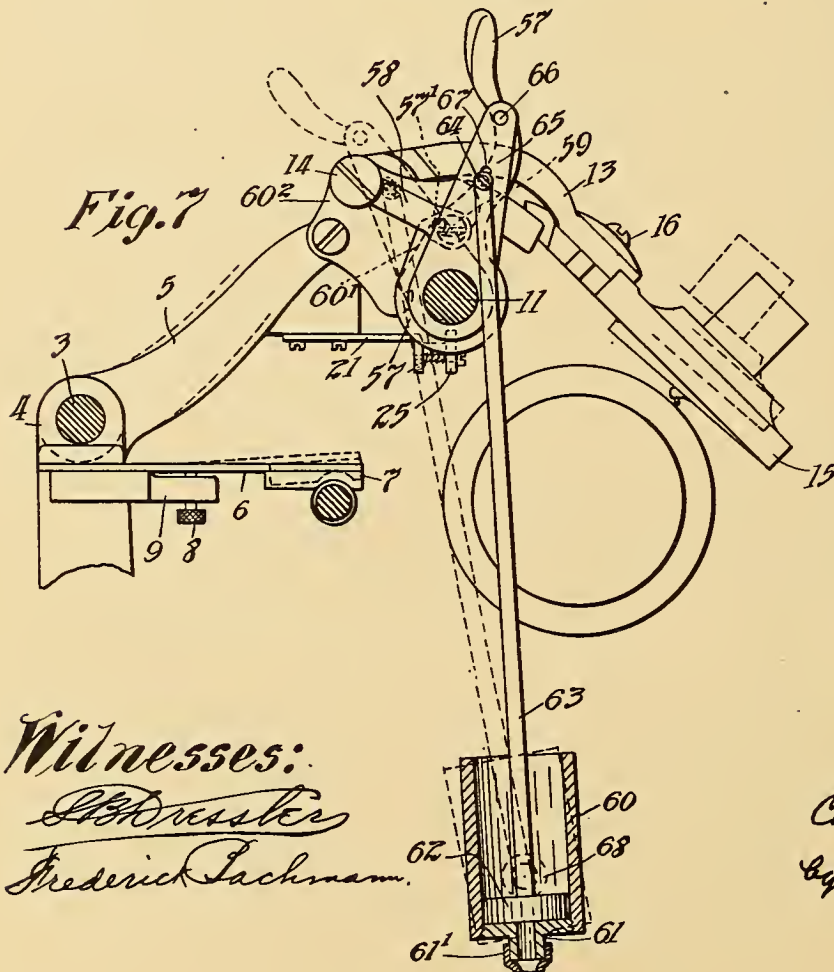


Fig. 7



Witnesses:

*Frederick Tachman.*

Inventor:

Charles S. Osborne  
 by *Frank L. Ryan*  
 his Atty.

# UNITED STATES PATENT OFFICE.

CHARLES S. OSBORNE, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,097,987.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed October 6, 1911. Serial No. 653,114.

*To all whom it may concern:*

Be it known that I, CHARLES S. OSBORNE, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, particularly those adapted for commercial purposes although obviously its use is not limited to machines of this type.

In transcribing a commercial record, the transcriber frequently finds it necessary to repeat a portion of the record. It has accordingly been customary to provide commercial phonographs with mechanism whereby the carrier arm supporting the reproducer may be stepped in a rearward direction along the record as shown, for example, in U. S. Patent No. 847,631, granted on March 19, 1907 to E. L. Aiken. With devices of this character, however, as heretofore known and constructed, it has been impossible to place the controlling member for the repeating mechanism in a convenient position for actuation by the transcriber while operating the typewriting machine.

The principal object of the present invention is to obviate this difficulty by providing means whereby the carrier arm may be readily raised and stepped in a rearward direction from a point in proximity to the keyboard of the typewriter or from any other desired point.

My invention also comprises certain other details of construction which will be hereinafter more fully set forth.

Referring to the accompanying drawing in which like parts are designated by the same reference numerals—Figure 1 is a plan view illustrating a phonograph located in proximity to the keyboard of the typewriter and embodying one form of my invention; Fig. 2 is an end elevation partly in section on the line 2—2 of Fig. 1; Figs. 3 and 4 are elevations illustrating details of construction; Fig. 5 is an end elevation of a modification; Fig. 6 is a plan view of a detail of construction employed in the modification shown in Fig. 5; and Fig. 7 is an elevation partly in section of another modification.

The phonograph shown comprises a body 1 mounted on a suitable cabinet 2. The body 1 is provided with a back rod 3 which extends transversely thereof and upon which the sleeve 4 which is connected to the carrier arm 5 is pivotally mounted, said sleeve carrying the usual feed nut spring 6 and feed nut 7.

The numeral 8 designates a screw mounted in a lug 9 which is secured to the sleeve 4 below the spring 6. The said screw engages the lower face of the spring 6 and serves to adjust the position of the feed nut 7 with reference to the feed screw 10 which extends parallel to the rod 3 and operates in the usual manner to impart feeding movement to the sleeve 4 and arm 5. Parallel with the rod 3 is front guide rod 11 which in the forms of my invention shown in Figs. 1 to 6 is adapted to support the forward end of the carrier arm 5, this arm being provided with a depending projection 12 which rests upon the rod 11 when the feed nut is in engagement with the feed screw 10, as shown in Fig. 2. An auxiliary arm 13 is pivoted upon a pin 14 carried by the arm 5. The arm 13 carries a spectacle frame 15 which is pivoted on the screw 16 carried by the said arm, said spectacle frame being adapted to turn on its pivot so as to bring either the recorder or reproducer mounted therein into operative position, as desired.

In the forms of my invention shown in Figs. 1 to 4, the means for elevating the carrier arm comprise a lift lever 17 pivoted to the guide rod 11 adjacent one end thereof as shown in Fig. 2 and supporting in its lower portion one end of a bar 18, which extends parallel to the guide rod 11 and is pivotally supported from the opposite end of the latter by a link similar to the lower portion of the lever 17. This bar engages slidably within a horizontal opening or slot 19 in a guide member 20 secured to a support 21 which is connected, as by screws 22, to the lower portion of the carrier arm 5. It is evident that whatever the position of the carrier arm along the record, the depression of the upper end of the lever 17 causes an elevation of the bar 18 and a corresponding elevation or lifting of the carrier arm 5.

The mechanism for spacing the carrier arm rearwardly is constructed as follows: The support 21 is provided with a down-



wardly extending lug 23 in which a screw 24 is mounted. Pivoted upon said screw is a pawl 25 which is normally held in the position shown in Fig. 4 by a coil spring 26, 5 connected at one end to the said screw or lug, and at the other end to said pawl. The lower surface of the rod 11 is provided with teeth forming a rack 27, the said teeth being adapted to be engaged by the pawl 25 10 when it is desired to step the arm 5 a short distance in a rearward direction. This rearward stepping is accomplished by the movement of the lever 17, which first effects the elevation of the arm 5 by the coöperation of the bar 18 and the member 20 so as 15 to disengage the feed nut from the feed screw, a further movement bringing the end of the pawl 25 into engagement with one of the teeth of the rack 27. A still further 20 movement of the lever 17 causes the pawl to move the arm 5 rearwardly since the free end or point of the pawl is held by the rack, causing the pivot 24 to move in an arc about the point of the pawl as the center. If de- 25 sired, the lever may be operated a second time or any number of times in order to increase the amount of the record repeated.

In Figs. 1 to 4 inclusive, I have shown a means for extending the control of the lifting and spacing mechanism to a point at the 30 side of the keyboard 28 of a typewriter, the phonograph being placed in the rear of the typewriter with one of the ends thereof facing the operator. In this form of my invention, I provide a rock shaft 29 mounted in suitable brackets 30 secured to the phonograph cabinet, this shaft being held against 35 endwise movement in the brackets 30 by a plurality of collars or stops 31 secured thereto and engaging the sides of the brackets. A pulley 32 is secured to the shaft 29 and motion is transmitted from this pulley 40 to the lever 17 by a cord 33 secured at one end to the periphery of said pulley and at 45 the other end to the outer end of said lever. Suitable means such as an idle pulley 34 mounted in a support 35 which is secured to the cabinet 30 is provided to guide or direct the cord 33 from the pulley 32 to the 50 lever 17. The shaft 29 is actuated in any suitable way, as by a lever or arm 36 secured, as by a screw 37, to the said rock shaft and provided with a finger piece 38 located in proximity to the keyboard of the 55 typewriter. In this form of my invention, the arm or lever 36 extends along one side of the typewriter. With the device just described, it is evident that the back spacing attachment of the phonograph may be conveniently controlled by the transcriber during 60 the operation of the typewriter.

In the form of my invention shown in Figs. 5 and 6 the lift lever 17' supporting the bar 18, instead of extending upwardly 65 as in the form of my invention in Figs. 1

to 4 projects downwardly into the path of the record 39 when the carriage is in its lowered position so as to render it impossible to remove the said record from the support 40 or to place a new record thereon without 70 elevating the carrier arm. This lever is adapted to be moved about its pivot by a member 41 pivoted on the outer end of the rod 11 and retained thereon by a cap 41' or other suitable means. The member 41 extends downwardly as shown at 42 and then 75 inwardly as shown at 43, the inwardly directed portion 43 being provided at its end with a forklike portion 43' within which is received the lever 17'. An arm 44 extends 80 horizontally and rearwardly from the downwardly extending portion 42, the said arm resting upon a rod 45 adapted to slide vertically through the top wall of the cabinet and the base plate of the phonograph body. 85 This rod is preferably supported upon a spring or compression member 46 resting on the top of the said base plate of the said phonograph body, the upper end thereof engaging a collar 47 secured to the rod 45. 90 The spring 46 acts as a cushion for the carrier arm and parts connected thereto during the downward movement of the said arm. The lower end of the rod 45 rests upon an arm 48 located within the phonograph cabi- 95 net and secured, as by screw 49, to a rock shaft 50 extending through the side wall of the said cabinet, the outer end of this shaft carrying an arm 51 which is secured thereto, as by a screw 52. A lever 53 of suitable 100 length is pivoted to the phonograph cabinet, as shown at 54; and one end of the said lever is connected, as by link 55, to the outer end of the arm 51. With the mechanism just described, the phonograph may be 105 placed in the rear of the typewriter, the lever 53 extending alongside of the typewriter with the finger piece 56 in close proximity to the keyboard of the latter; so that by depressing the said finger piece, the rock shaft 110 50 may be oscillated by the lever 53, arm 51, and link 55 to cause the elevation of the arm 48 and rod 45 and thereby shift the member 41 on its pivot so as to cause the member 17' to lift the bar 18 and the carrier arm 5. The 115 said arm is simultaneously shifted rearwardly by the pawl 25 and rack 27, as hereinbefore described.

In the form of my invention shown in Fig. 7, I employ pneumatic means for controlling the mechanism for lifting the carrier arm and spacing the same rearwardly, the controlling mechanism, in this form of my invention, being connected to a carrier arm lifting mechanism invented by Charles 120 L. Hibbard and disclosed in Patent No. 1,023,250, Apl. 16, 1912, of the said Hibbard, entitled "Phonographs". This lifting mechanism comprises a lift lever 57 rotatably and slidably mounted upon the for- 125 130



ward guide rod 11, as by being provided with a passageway in the lower end thereof through which the guide rod passes. A link 58 is pivotally connected to the lever 57, as by means of a pin or screw 59, and is pivotally connected to the carrier arm 5 by the pin 14 already referred to, the link 58 being mounted for free rotation around both pins 59 and 14. By this construction, a toggle joint is provided, the center point of which is the stud 59, the two arms being the link 58 and the portion of the lever 57 between the rod 11 and the stud 59 respectively. By forcing the lever 57 to the left as shown in Fig. 7, the toggle is straightened out and the carrier arm raised, the stylus being raised out of its engagement with the rod surface, while by movement of the lever 57 to the right, the toggle is opened out and the stylus lowered into engagement with the record. The lever 57 is stopped in its extreme movements by the engagement of pin 57', which is carried on the back of lever 57, against the ends of the recess 60' in the plate 60<sup>2</sup> which is secured to the carrier arm. In order to control the movement of the lever 57, I provide a cylinder 60 having a neck 61 whereby the same may be connected, as by a flexible rubber tube 61', to a suitable controlling member such as a bulb, not shown, of the type commonly used in connection with the shutter mechanism of photographic cameras. A piston 62 fits slidably within the cylinder 60, this piston being secured upon the lower end of the rod 63 which is connected at its upper end, as by a pivot pin 64, to an arm 65 pivotally mounted on the guide rod 11 and connected to the lever 57, as by the pin 66. The pin 64 is preferably movable to a slight extent within a short slot 67 extending longitudinally in the arm 65. With this construction, the piston moves a short distance independently of the arm 65. When the pin reaches the end of its travel the impact thereof against the end of the slot 67 causes a rapid movement of the arm 65 and the parts connected therewith. The cylinder 60 is mounted upon a pivot 68 so as to be capable of adjusting itself to the lateral movement of the piston rod and piston. When air is forced into the cylinder 60 by any suitable means, the piston 62 is first given an upward movement to move the lever 57 to the left as shown in Fig. 7, the momentum of the traveling moving parts being sufficient to carry the piston rod 63 beyond the dead center between the pivot 68 and rod 11; so that, when the air is permitted to escape from the said piston, the weight of the carrier arm will cause the parts to assume the position shown in dotted lines in said figure. With this construction, a tube of any suitable length may be employed and the bulb or other controlling member may be placed in

any convenient position for operation thereof.

While I have described a particular mechanism for the sake of clearness, it is obvious that my invention is not limited to the particular details of construction shown and described, but that various modifications and equivalents may be employed within my invention and within the scope of the appended claims.

Having now described my invention what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph, the combination with a pivotally mounted carrier arm, of a guide rod for supporting the free end of said arm, a pivotally mounted bar extending parallel to the said rod and adapted to lift said carrier arm, means for moving said bar to lift said arm and means coacting with said guide rod when the carrier arm is lifted to impart a lateral movement to said carrier arm, substantially as described.

2. In a phonograph, the combination with a pivotally mounted carrier arm, and means for progressively moving the same when in a lowered position, of a guide rod for supporting the free end of said arm, a slotted member connected with said arm, a bar coacting with said member and extending through the slot therein parallel to said rod, the said bar being pivoted to said rod, and a lever for lifting said bar, substantially as described.

3. In a phonograph, the combination with a record support, and a pivotally mounted carrier arm, of means for moving said arm to inoperative position, means rigidly connected to said moving means and movable therewith for preventing the placing of a record on the support when the carrier arm is in operative position, and means for moving the carrier arm out of operative position, substantially as described.

4. In a phonograph, the combination with a record support, a pivotally mounted carrier arm and a guide rod for supporting the free end of said arm, of means mounted for pivotal movement about the guide rod for moving said arm to inoperative position, means rigidly connected to said moving means and movable therewith for preventing the placing of a record on the support when the carrier arm is in operative position, and means for moving the second named means and thereby the carrier arm out of operative position, substantially as described.

5. In a phonograph, the combination with a pivotally mounted carrier arm, of means for lifting said arm comprising a lift lever, a slide, means for connecting said lever and slide, a rock shaft, means connected to said shaft for shifting said slide, and means for

rotating said rock shaft, substantially as described.

6. In a phonograph, the combination of a record support and a pivotally mounted carrier arm, of means for lifting said carrier arm comprising a member for preventing the placing of a record on the support when the carriage is in a lowered position, a slide, means for connecting said member and slide,

a rock shaft, means connected thereto for shifting said slide, and means for rotating said rock shaft, substantially as described. 10

This specification signed and witnessed this 3rd day of October, 1911.

CHARLES S. OSBORNE.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



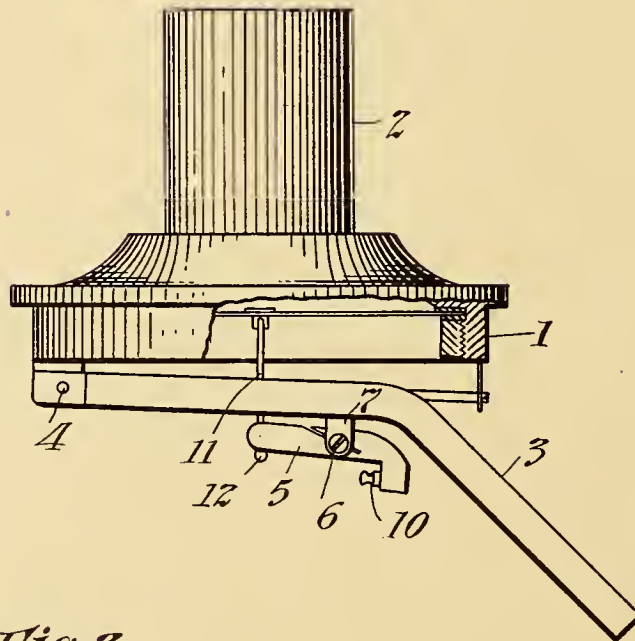


A. N. PIERMAN.  
 PHONOGRAPH.  
 APPLICATION FILED DEC. 20, 1907.

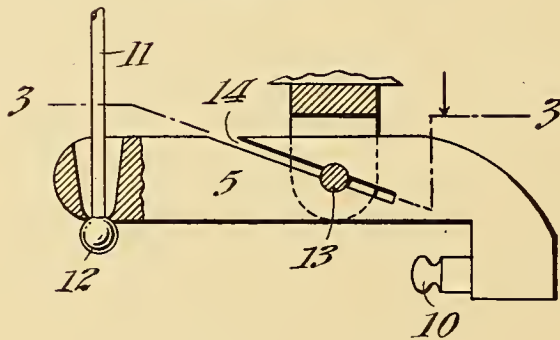
1,097,989.

Patented May 26, 1914.

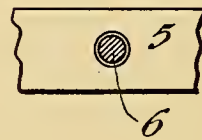
*Fig. 1*



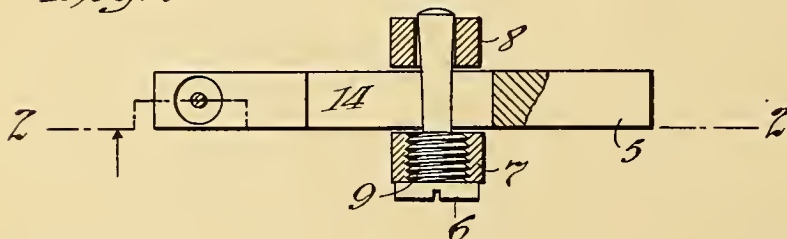
*Fig. 2*



*Fig. 4*



*Fig. 3*



*Witnesses:*  
 Frank D. Lewis  
 H. H. Dyke

*Inventor:*  
 Alexander N. Pierman  
 by Frank L. Dyke  
 Atty.

# UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,097,989.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed December 20, 1907. Serial No. 407,277.

*To all whom it may concern:*

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and allied talking machines and particularly to improvements in the lever which carries the reproducer ball or point. In the reproduction of sounds by means of a phonograph it is of the utmost importance that the vibrations imparted to the stylus in its travel over the minute undulations of the record surface be faithfully transmitted to the diaphragm without any change whatever due to foreign causes, such, for example, as lost motion. Since the extreme width of the record groove in the standard phonograph record cylinder is not over one one-hundredth of an inch and it does not exceed in depth one one-thousandth of an inch, it is evident that the slightest lost motion will affect very seriously the reproduction of sound, and this is the more true because it is the practice in instruments of this type to amplify the vibrations of the stylus which are imparted to the diaphragm which results also in multiplying any lost motion which may be present. This amplification is usually accomplished by mounting the reproducing ball or point on the shorter arm of a pivoted lever the opposite and longer arm whereof is connected to the diaphragm. In this art the reproducing ball or point is often termed the reproducing stylus, and for convenience of reference the lever carrying the same is hereinafter called the stylus lever.

It is the object of this invention to provide a stylus lever for the phonograph so constructed that all possibility of lost motion due to the pivoting of the said lever in its support shall be overcome.

In order that my invention may be fully understood, attention is directed to the accompanying drawing wherein the same reference numerals are applied uniformly to the same parts, and in which—

Figure 1 is a view in side elevation of a phonograph reproducer equipped with my improvement, and Figs. 2, 3 and 4 are sec-

tional detail views, Fig. 2 being taken on the line 2—2 of Fig. 3, and Fig. 3 being taken on the line 3—3 of Fig. 2.

The body of the reproducer is represented at 1 and the neck thereof at 2. The floating weight 3 is pivoted to the reproducer body at 4, and to this weight the stylus lever 5 is pivoted by means of the pivot pin 6 passing through the stylus lever and the lugs 7 and 8 extending downwardly from the floating weight 3, the threaded shoulder 9 of the pivot pin fitting within the screw threaded opening within the lug 7. The stylus lever 5 carries the reproducing point or stylus 10 near one end and on the under side thereof and its opposite end is connected to the diaphragm by the link 11. As the diaphragm is subjected to downward tension and flexure because of the downward pull of the floating weight, when the device is being used for the reproduction of sound, and the diaphragm is caused to vibrate only by changes in the downward pull thereon and not by alternate upward thrusts and downward pulls, it is only necessary to secure the link 11 in the stylus lever 5 so that it is incapable of upward movement relative thereto. When the link 11 is passed through a horizontal opening in the stylus lever and its lower end bent into the form of a hook or circle, as is the usual practice, a considerable amount of delicate manipulation is necessary to fasten this lever as close to the diaphragm as is desirable, and it is also difficult to shape the link so that it shall pull upward from the middle of the stylus lever and any slight bend will cause it to tend to twist the stylus lever somewhat.

In my improved device a substantially cone shaped opening is formed in the stylus lever with its smaller end directed downwardly. The link 11 is passed through this opening and a ball 12 of larger diameter than the small end of said opening is formed on the lower end of the link. One way in which this ball may conveniently be formed is by bending the end of the link back upon itself and placing a drop of melted solder thereon, or the solder may be placed on the end of the link without bending back the end thereof or any convenient method of forming a ball on the end of the link may be used. With the connection made in this manner the link always pulls upward from



the center of the stylus lever, ample lateral play is provided for and the link is given a firm bearing upon the lower face of the stylus lever. I have described this form of link attachment in connection with a diaphragm reproducer but it is to be understood, however, that it may be used with other forms of reproducing mechanism.

If it were practicable to form the pivot pin 6 of a uniform diameter throughout its length, no special provision would be necessary to avoid lost motion of the parts, since the openings in the stylus lever 5 and the lug 8 could each be made of the same diameter as the pivot pin, and the close fit of all the parts would thus be assured and all lost motion would be avoided, but it is found impracticable to make these pivot pins in large quantities so that they shall be of uniform diameter throughout their length. The present practice is to form such pins from a long rod, the end of the rod being allowed to protrude from a chuck to an extent equal to the length of the finished pin. This chuck and the rod held therein are rotated and by means of various tools acting upon the rotating rod, the pin is cut to size, threaded and finally cut off from the end of the rod, after which the rod is pushed out from the chuck a distance equal to the length of another pin and this operation is repeated indefinitely.

The parts of the phonograph reproducer are quite small and delicate and the diameter of this pivot pin is therefore necessarily very small, it being in fact in the neighborhood of twenty-five one-thousandths of an inch, and, as the pin has a length of several times its diameter, when the cutting tool is brought up to one side of the rotating rod to cut the same down to the size of the finished pin, the outer end thereof will be pushed to one side and as a result the diameter of the pin at or near its end is greater than it is at the center or near its head. As a result of the pin being made in this way, when the opening in the stylus lever is formed sufficiently large to permit the passage of the pin therethrough, as is necessary in order to assemble the parts, and the lever is placed in the position upon the pin which it finally occupies, as shown in Fig. 3 of the drawing, a looseness of fit is produced which may amount to two or three thousandths of an inch (see Fig. 4), and thereby lost motion is caused in the turning of the lever upon the pivot pin. In order to obviate this difficulty and to do away entirely with all lost motion of the stylus lever upon the pivot pin, I form the opening in the said stylus lever only as large as the smallest part of the pivot pin or slightly smaller than this size, and I then cut a slot or kerf 14 in the material of the stylus lever, which slot communicates with the opening 13 in the said

lever. The slot or kerf 14 is shown in the drawings as having been cut inwardly from the periphery of the stylus and intersecting and passing beyond the opening 13, but it is obvious that this slot or kerf need not extend to the periphery of the lever and it need not extend beyond the opening at both sides thereof, it being important only that it shall communicate with the opening in order that by separating the walls of the slot or forcing them nearer one another, the size of the opening 13 may be increased or diminished. I also form the pivot pin 6 with a slight bevel at its outer end. The parts being thus constructed may be readily assembled by pushing the pivot pin 6 forcibly into place and screwing it into the lug 7. As the stylus lever is formed of resilient material, preferably of steel or brass, the walls of the kerf 14 which are spread apart by the passage of the enlarged end of the pin 6 through the opening 13, will spring together again, and the central portion of the pin, which is of reduced diameter, will fit closely within the opening in the stylus lever. If it is found that the fit of these parts is too tight, and as a result the stylus lever does not readily turn upon the pivot pin, the grip of the lever upon the pin may be reduced by prying the walls of the slot or kerf therein slightly apart, or, if the fit of the parts be found to be too loose, the size of the opening may be reduced, as for example, by pressing the walls of the kerf or slot together with a pair of pliers. By the use of the slotted stylus lever constructed as above described I am enabled to adjust the size of the opening in the stylus lever to fit the pivot pin and thereby avoid all lost motion between the lever and the pin.

Having now described my invention, what I claim is:

1. In a reproducer, the combination of vibratory means, a stylus lever having at one end thereof a conical opening, the smaller end of said opening being directed away from said vibratory means, and means passing through said opening for connecting said lever to said vibratory means, substantially as described.

2. In a phonograph reproducer, the combination of a diaphragm, a body in which said diaphragm is fixed, a floating weight pivoted to said body, a stylus lever having a cone shaped opening near one end thereof, a stylus on said lever, a link connected to said diaphragm and passing through the said opening and having a ball on its lower end, substantially as set forth.

3. In a phonograph reproducer, the combination of a diaphragm, a body in which said diaphragm is secured, a stylus lever pivotally supported adjacent thereto, said lever carrying a stylus at one end and being provided with an opening in a vertical plane

near the other end thereof, and a link connected to said diaphragm, and passing through said opening and having a ball on its lower end, substantially as set forth.

5 4. In combination with a stylus lever, a pivot pin therefor having a tapered end, a central portion reduced with respect to said end and supporting said lever, and a threaded shoulder at its opposite end, and means  
10 provided with a threaded portion engaging said shoulder for supporting said pivot pin, substantially as set forth.

5 5. In a device of the class described, the combination of a pivot pin, and a stylus lever  
15 mounted on said pin and adapted to oscillate on the same, said lever having an opening for said pin and resiliently connected portions on opposite sides of said opening to snugly incase said pin within said opening,  
20 substantially as described.

25 6. In a device of the class described, the combination of a pivot pin, and a stylus lever mounted on said pin and adapted to oscillate on the same, said lever having an  
30 opening for said pin and a slot or kerf communicating with said opening, substantially as described.

7. In a device of the class described, the combination of a pivot pin, and a stylus  
35 lever mounted on said pin and adapted to oscillate on the same, said lever having an opening for said pin and a slot or kerf communicating with said opening and extend-

ing to the periphery of the lever, substantially as described. 35

8. In a device of the class described, the combination of a pivot pin, and a stylus lever mounted on said pin and adapted to oscillate on the same, said lever having an opening  
40 for said pin and a slot or kerf communicating with said opening and extending on opposite sides thereof, substantially as described.

9. A stylus lever for sound reproducers having a conical opening adjacent one end  
45 thereof and a stylus adjacent the other end thereof, said stylus being positioned on the under side of said lever and the smaller end of said opening being downwardly directed, substantially as described. 50

10. In a phonograph reproducer, the combination of a diaphragm, a support therefor, a stylus lever, a stylus at one end and provided with an inverted cone shaped opening  
55 near the other end thereof, and a link connected to said diaphragm, passing through said opening, and having a ball below said opening of larger diameter than the bottom of said opening, substantially as described.

This specification signed and witnessed  
60 this 17th day of December, 1907.

ALEXANDER N. PIERMAN.

Witnesses:

FRANK D. LEWIS,  
CHARLES F. ROBSON.



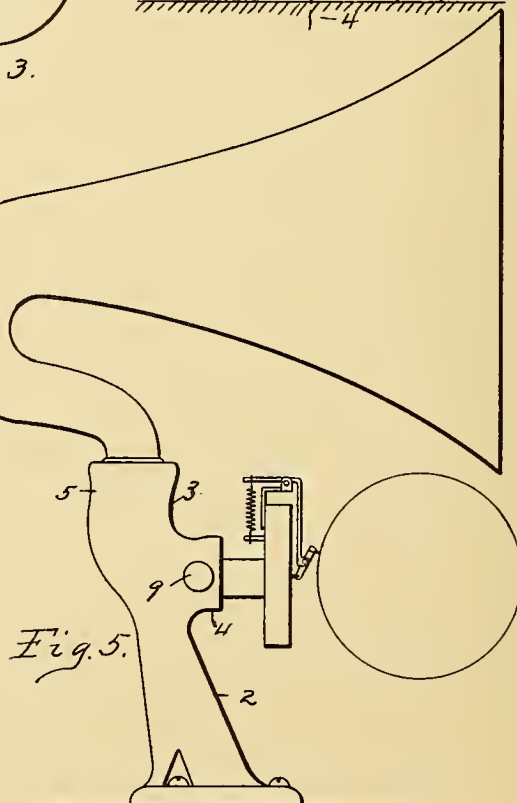
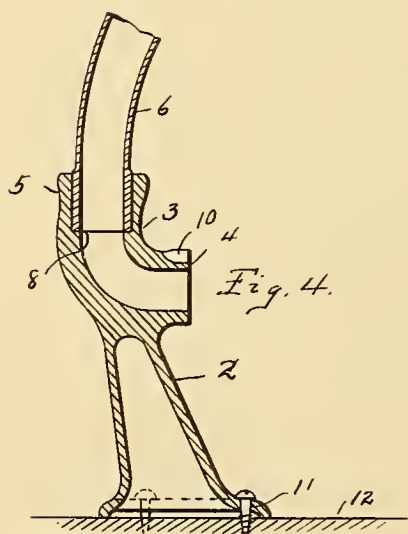
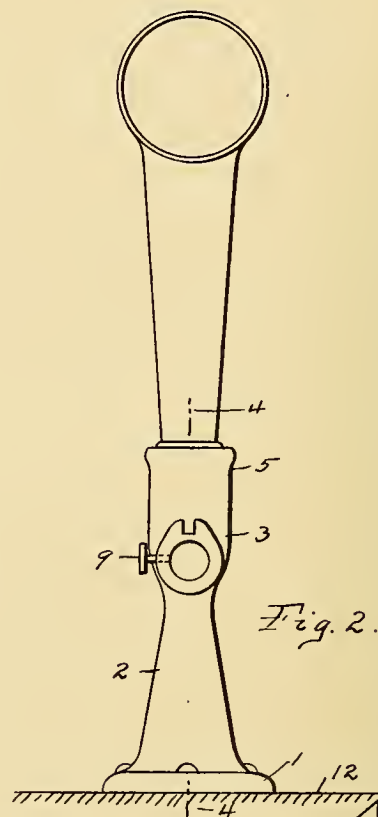
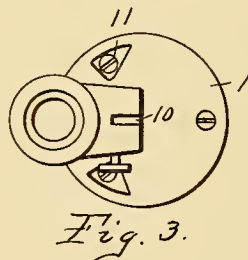
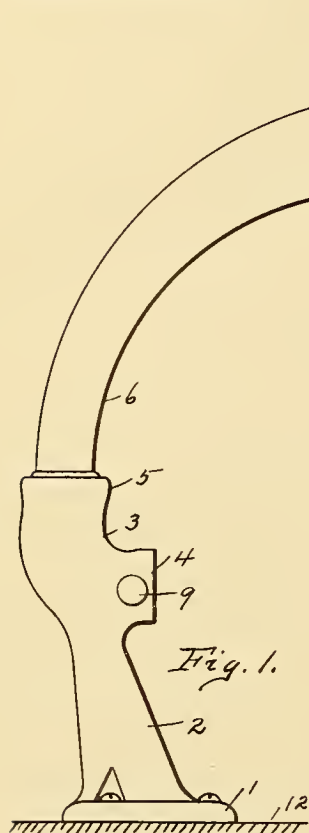




P. CATUCCI.  
HORN SUPPORT.  
APPLICATION FILED AUG. 13, 1912.

1,098,313.

Patented May 26, 1914.



Witnesses:  
Gertrude S. Sanders  
Anthony Cassell

Pliny Catucci Inventor  
By Attorney  
Louis M. Sanders

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## HORN-SUPPORT.

1,098,313.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed August 13, 1912. Serial No. 714,765.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Horn-Supports, of which the following is a specification.

The object of my invention is to provide a rigid, substantial support, to be secured to the motor plate of a phonograph, for carrying the amplifying horn, and also for supporting the sound box in a position adjacent the sound record to be played upon the instrument.

In my Design Patent No. 41,499 dated June 20, 1911, I have shown substantially the same form of structure, and in my patent application filed May 29, 1911 Ser. No. 630,170, I have shown similar horn supports, specially adapted to the purposes disclosed therein, and my present application may be considered a division of said application so far as it relates to common subject matter.

In the accompanying drawing, Figure 1, is a side elevation of the support. Fig. 2, is a front elevation. Fig. 3, is a plan view. Fig. 4, is a sectional view taken on line 4—4 of Fig. 2. Fig. 5, is a side elevation showing the support in connection with a well known form of horn.

Similar reference numerals refer to like parts throughout the specification and drawings.

The support consists of a single casting having the broad circular base 1, the upright and slightly inclined standard 2, with the tubular elbow 3 at the upper end thereof. This elbow has one arm 4 open horizontally to receive the connecting thimble of a sound box and the other arm 5 open vertically to receive the connecting small end 6 of the amplifying horn 7, which may swing about in a horizontal plane. The opening in the arm 5 is slightly larger than the general inside diameter of the elbow and has a shoulder 8 at the bottom, for the small end of the horn to rest upon. The horizontal arm 4 of the elbow is provided with a lateral screw threaded aperture into which is screwed the set screw 9, to secure the thimble of a sound box in place.

In order that the sound box may always be put in the same position upon the support it has a pin at the rear side, and so located as to enter the open slot 10, which is for convenience cut in the upper surface of the horizontal arm. The base 1 is broad and flat and provided with screw holes 11, by which the horn support is firmly and permanently secured to the motor plate 12 of the phonograph.

In practice the small end of the horn is inserted into the enlarged vertical opening in the elbow 3, where it may be adjusted to any direction in a horizontal plane. The firmness of the support will permit the use of very large overhanging horns as well as the type of horn shown in Fig. 5. In the latter case, from the peculiar shape of the horn it is well balanced, and produces no appreciable lateral strain.

It will thus be seen that I have accomplished the objects of my invention with a simple neat and effective support, by the use of which the old and cumbersome horn crane is entirely dispensed with, and at the same time the support carries means for holding the sound box in proper position relative to the sound record.

I claim:

A horn support for phonographs comprising a single casting, having a flat circular base with means for securing the same to the horizontal motor plate of a phonograph, an inclined standard extending upwardly and rearwardly from said base, said standard having at its upper end a tubular elbow, one of whose arms extends vertically upward and the other of whose arms extends horizontally outward, said vertical arm having a shouldered socket therein to receive and support an amplifying horn and said horizontal arm having a set screw and a locating slot therein for rigidly securing and connecting the thimble of a sound box thereto.

PLINY CATUCCI.

Witnesses:

ANTHONY VASSELLI,  
LOUIS M. SANDERS.



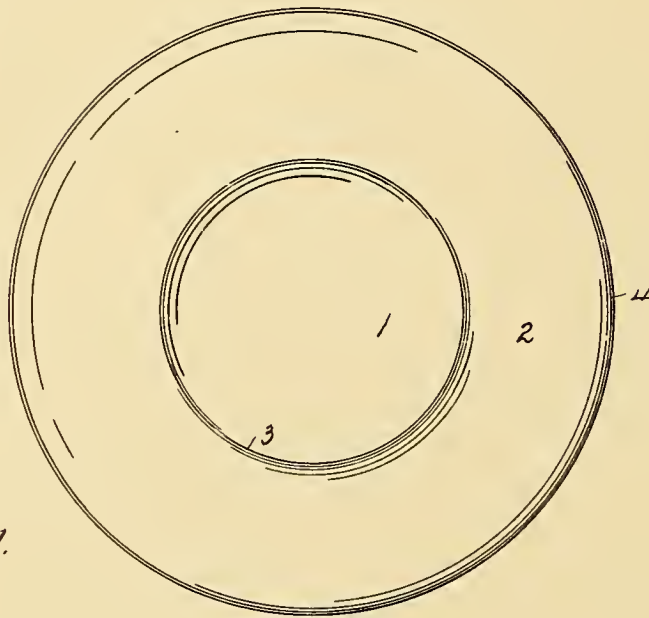




P. WEBER.  
DIAPHRAGM FOR PHONOGRAPH SOUND BOXES.  
APPLICATION FILED MAY 24, 1913.

1,098,340.

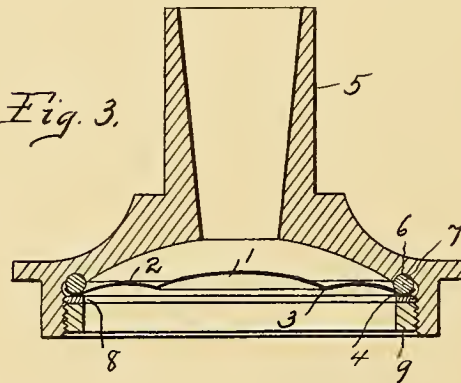
Patented May 26, 1914.



*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

Witnesses.  
L. Green.  
Gertrude L. Sanders.

Peter Weber Inventor  
By Louis M. Sanders  
Attorney



# UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY.

DIAPHRAGM FOR PHONOGRAPH SOUND-BOXES.

1,098,340.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed May 24, 1913. Serial No. 769,597.

*To all whom it may concern:*

Be it known that I, PETER WEBER, a citizen of the United States, residing in the city of Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Diaphragms for Phonograph Sound-Boxes, of which the following is a full, clear, and exact description.

My invention relates to diaphragms and has for its object the provision of a central stiff vibrating zone surrounded by an elastic, flexible, annular zone and it has for its object the preservation of the clearness and distinctness of sound transmitted by the diaphragm as well as the obviation of the deflection of sound waves and their consequent interference with one another.

It also has for a further object, the provision of means whereby the diaphragm may be properly centered within the sound box without contact with the metallic portions thereof.

These and other objects will appear from the following detailed description taken in connection with the accompanying drawing, wherein—

Figure 1 illustrates a plan view of my improved diaphragm. Fig. 2 is a central or diametrical section of the diaphragm. Fig. 3 is a vertical section through a sound box showing my improved diaphragm in position.

Similar reference numerals refer to like parts throughout the specification and drawings.

The diaphragm is composed of a thin sheet of metal or other suitable material of the proper strength and elasticity. The central circular zone 1, is pressed into a shallow spherical shape, as clearly illustrated in Fig. 2. The surrounding annular zone 2, is slightly curved in cross section as shown, and unites with the margin of the central zone 1, in a cusp-like ridge or corrugation 3. The extreme margin of the diaphragm is reversely curved as at 4.

The sound box in which my improved diaphragm is mounted may be of any usual or preferred type; as for example that illustrated in cross section in Fig. 3. In this case the sound box is provided with the hollow connecting thimble 5, through which the sound waves, generated by the diaphragm are directed to the sound amplifier. Within the sound box body, the annular gasket

seat 6 is provided, said gasket seat being curved in cross section to receive the ring gasket 7, which is circular in cross section. The curved margin 4 of the diaphragm rests upon and closely fits the outer surface of the annular gasket 7, in such a manner that the extreme edge of the gasket does not come in contact with the metal portion of the sound box.

As will be readily seen the curved margin 4, fits closely to the surface of the gasket ring 7, in such a manner as to properly center the diaphragm and when the outer gasket 8 and retaining ring 9 are in position, the diaphragm is held firmly in place without liability of contact between the edge of the diaphragm and the metal parts of the sound box.

I have not shown the usual stylus lever and stylus, and their connection with the diaphragm, as they form no part of my present invention. They may be of any usual or preferred type either for use in connection with what has come to be known as the disk phonograph or with the cylindrical type of phonograph.

It will be noted that the cusp-like corrugation or ridge 3 at the juncture of the central zone 1, and the annular zone 2, is wholly above a plane tangent to the annular curved margin 4. I find that the location of the corrugation 3, above this plane gives better results in the way of clearness and definition of tone than when such ridge is located either coincident with or below the plane tangent to the surface of the curved edge 4.

The making of the central zone 1, spherical or dished shaped, renders it substantially rigid and under the influence of the sound record with which the sound box is intended to be used, this central zone vibrates as a whole so that the sound waves thus generated are transmitted in substantially direct lines. The annular zone 2 being highly elastic readily permits this vibration of the central zone 1, so that by the use of a diaphragm constructed in the manner described, the natural tone of the sounds transmitted is preserved with extreme clearness and distinctness and without sound-wave interference.

From an inspection of Fig. 2 it will be noted that the disk from which the diaphragm is formed is generally upwardly curved in cross-section and that the cusp-like corruga-

tion 3, is located substantially midway between the center and the circumference of the disk. This general upward curve in cross-section of the disk is such that the apex of the corrugation 3 lies above the plane tangent to the reversely curved margin 4 of the disk.

I claim:

1. A diaphragm for sound boxes composed of a disk of resilient material formed into a central arc shaped zone, and a circular zone, said zones being united midway between the center and circumference of said diaphragm in a cusp-like annular ridge, said circular zone being curved in cross-section and reversely curved at its external circumference.

2. A diaphragm for sound boxes composed of a disk of strong elastic sheet metal having its margin curved in cross section, with an annular zone also curved in cross-section, and a central rigid zone, said zones being connected by a cusp-like annular ridge or corrugation midway between the center and circumference of said diaphragm.

3. A diaphragm for sound boxes composed of a disk of sheet metal having an annular cusp-like corrugation therein, midway between the center and the circumference of said disk, with the portions both within and without said corrugation upwardly curved in cross-section, and the ex-

treme margin of the disk reversely curved in cross-section.

4. A diaphragm for sound boxes, composed of a thin disk of elastic sheet metal, having a central rigid zone surrounded by an annular, flexible zone of equal radial width which is curved in cross-section and whose edge is reversely curved.

5. A diaphragm for sound boxes, composed of a disk of resilient sheet metal, having a cusp-like annular corrugation therein midway between its center and circumference, with the portion within said corrugation upwardly arched or curved into a substantially spherical surface, and the portion without said corrugation upwardly curved and its edge reversely curved.

6. A diaphragm for sound boxes, composed of a disk of resilient sheet metal, upwardly curved in cross-section and having a single downwardly extending cusp-like annular corrugation midway between the center and circumference of said disk, the apex of said corrugation lying above a plane tangent to the surface of the edge of said disk.

In testimony whereof, I have hereunto set my hand this 20th day of May, 1913.

PETER WEBER.

In presence of—

GEO. W. PERRY,  
L. M. SANDERS.

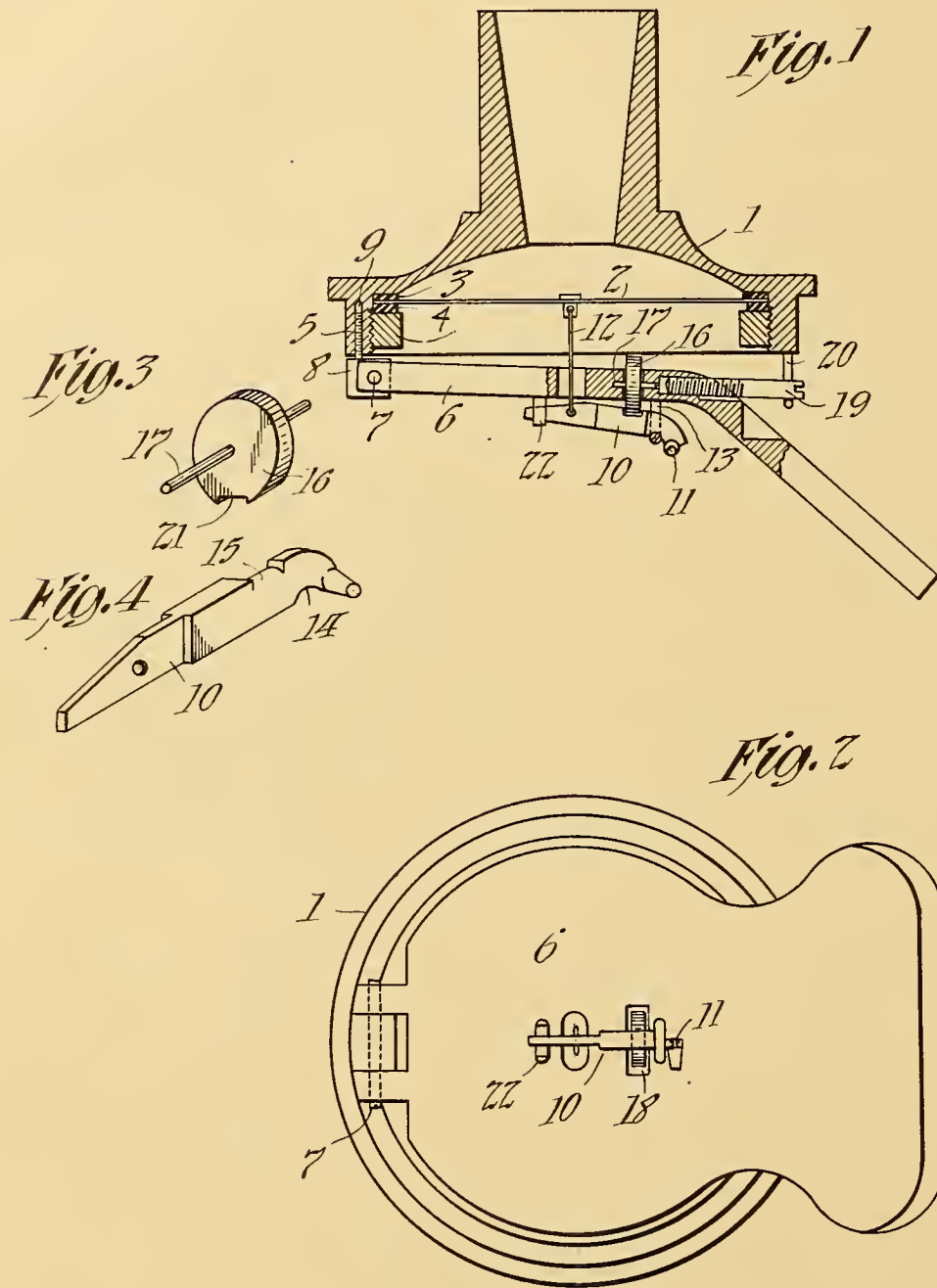




T. A. EDISON.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED OCT. 28, 1909.

1,099,346.

Patented June 9, 1914.



*Witnesses:*  
 Frank D. Lewis  
 Dyer Smith

*Inventor:*  
 Thomas A. Edison,  
 by Frank L. Dyer  
 his Atty.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-REPRODUCER.

1,099,346.

Specification of Letters Patent.

Patented June 9, 1914.

Application filed October 28, 1909. Serial No. 525,061.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, county of Essex, and State of New Jersey, have made a certain new and useful Invention in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers, and has for its object the provision of an improved mounting for the stylus lever in order that the same may have great freedom of movement in tracking the grooves of the sound record.

More particularly, the object of my invention is to provide a mounting for the stylus lever whereby the latter may rock in its own vertical plane about a pivot as the stylus tracks the record groove while at the same time the lever may rock in a transverse direction to enable the stylus to follow the contour of the record groove with greater facility. The requirement of great facility of movement of the stylus lever both in a direction parallel to and transverse to the record groove, is particularly important in the case of a record having two hundred threads or a greater number of threads per inch, owing to the thin walls between the record grooves which might be broken down or jumped across by a stylus, the parts moving with which have considerable inertia, and owing to the character of the record grooves generally. Accordingly, I provide a member which bears upon the upper surface of the stylus lever to constitute a fulcrum for the latter, the cooperating surfaces of the pivot member and the lever being so formed as to permit a limited rolling movement between the same in a plane transverse to the stylus lever. Preferably, the stylus lever is formed on its upper side with a convex surface cooperating with the surface of the pivot member, which latter is preferably mounted for rotation to reduce friction.

Other objects of my invention are the provision of improved details of construction and the combination of parts.

In order that my invention may be more clearly understood, reference is hereby made to the accompanying drawings, illustrating a preferred form thereof, in which—

Figure 1 is a central vertical section through a reproducer equipped with my in-

vention. Fig. 2 is a bottom view thereof, and Figs. 3 and 4 represent in perspective the rotatable pivot member and stylus lever adapted to coact therewith.

Referring to the drawings, the usual sound box 1 is provided with diaphragm 2 which is clamped between gaskets 3, the whole being held in place by ring 4 which is threaded within flange 5 of sound box 1 in the usual manner. Floating weight 6 is pivoted at 7 to block 8 which is supported from flange 5 by pin or screw 9, as is common. Stylus lever 10 carries stylus 11, the lever being connected to diaphragm 2 by link 12, the lever being supported from floating weight 6 when stylus 11 is not in contact with the record by means of stirrup 13 encircling lever 10, lever 10 being provided on its lower surface with a groove 14 for the reception of the stirrup. The upper surface of stylus lever 10 is preferably convexed in a direction transverse to the length or the median plane of the stylus lever as shown at 15. Disk 16, which is supported by pin 17 is mounted in slot 18 in floating weight 6 directly above surface 15 of lever 10. Pin 17 is rotatably mounted in suitable holes in the floating weight on each side of slot 18, so that disk 16 is free to rotate about an axis substantially parallel to the length or longitudinal axis of the lever and in a plane approximately vertical. Floating weight 6 is provided with the usual screw 19, the end of which is supported within stirrup 20 depending from flange 5 of the reproducer to limit the downward movement of the floating weight. Before screwing pin 19 into place, pivot member 16 may be placed in position within its slot 18 and support 17 thereafter pushed through the hole designed for the reception of screw 19 into position to support member 16. Member 16 is preferably provided on its lower surface with notch 21 which affords a plane surface to cooperate with convex surface 15 of lever 10, the shoulders of the notch serving to limit the rotation of the disk 16 and likewise the lateral rocking movement of lever 10, since surface 15 of the lever tends to bind when it comes into contact with either shoulder of notch 21.

The result of the construction above described is that when stylus 11 engages the record, lever 10, after moving out of engage-



ment with the stirrup 13, rocks upon surface 21 as a pivot in a vertical plane as stylus 11 tracks the record groove. Also, lever 10 is free to rock through a limited arc in a plane transverse to its length, the rotatable mounting of member 16 permitting rotation of said member by the lever 10 and thereby reducing friction to a minimum during this movement of the lever. Lever 10 may also oscillate through a limited arc in a plane substantially parallel with diaphragm 2, although during this movement, the rotation of member 16 is not brought into play. The tail of lever 10 rests within a V-shaped stirrup 22 depending from floating weight 6, this stirrup tending to properly center the stylus lever.

It is obvious that, if desired, the curved periphery of member 16 might be used to cooperate with surface 15 of lever 10, leaving out notch 21, or if the periphery of disk 16 was so used, it might be tapered into a V-shape in order to give a more nearly knife edge to act as upper pivot for the vertical oscillation of the lever, or the surface of notch 21 might be so tapered. It is furthermore obvious that, if desired, surface 15 of lever 10 co-acting with plane surface 21 of member 16 might be convexly curved in all directions, instead of merely being curved convexly transverse to the stylus lever as shown. That is, surface 15 instead of being curved as a cylinder, could be curved as a globe, if desired, to facilitate the rocking of the same. However, such a construction is not commercially as practicable as that shown.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph reproducer, the combination with a diaphragm and a floating weight, of a stylus lever, a connection between said lever and said diaphragm, and a pivot for said lever supported by said weight, said pivot consisting of a member adapted to be oscillated by said lever about an axis extending longitudinally of said lever, substantially as described.

2. In a phonograph reproducer, the combination of vibratory means, a stylus lever, a stylus carried by said lever, means connecting said lever to said vibratory means, means for supporting said lever when said stylus is not in engagement with a record, said supporting means being inoperative when said stylus is in engagement with a record, and a member contacting said lever and serving as a fulcrum for the latter when the stylus engages a record, said lever having rocking and rolling engagement with said member, substantially as described.

3. In a phonograph reproducer, the combination with the diaphragm and the floating weight, of a stylus lever, a stylus carried

thereby, a connection between said lever and diaphragm, and a pivot for said lever secured in said weight, said pivot consisting of a member adapted to be rotated by said lever in a plane crossing the median plane of said lever, and contacting a surface of said lever when the stylus engages a record, substantially as described.

4. In a phonograph reproducer, the combination of a stylus lever, a stylus carried thereby, supporting means, and a member mounted in said supporting means contacting the upper surface of said lever and serving as a fulcrum for the latter when the stylus engages the record, said lever having rocking engagement with said member in its own vertical plane and rolling engagement with said member whereby the latter is movable in a plane transverse to said vertical plane, substantially as described.

5. In a phonograph reproducer, the combination of a stylus lever, a stylus carried thereby, a diaphragm, a connection between said diaphragm and said lever, and a member acting as a fulcrum for said lever and adapted to be oscillated laterally thereby, said lever and member having contacting surfaces one of which is plane and the other convex, substantially as described.

6. In a phonograph reproducer, the combination of a stylus lever and stylus carried thereby, a diaphragm, a connection between the same and said lever, supporting means, a member rotatably mounted in said means contacting the upper surface of said lever and serving as fulcrum for the latter when the stylus engages a record, said member being adapted to be rotated by said lever, means for supporting said lever when not engaging a record, and means for centering said lever, substantially as described.

7. In a phonograph reproducer, the combination of a stylus lever and stylus carried thereby, a diaphragm, a connection between the same and said lever, supporting means, a member mounted to rotate in said means in a plane transverse to said lever, said member having a surface contacting the upper surface of said lever and serving as fulcrum for the latter when the stylus engages a record, and carrying means for limiting the amount of rotation of said member when in contact with said lever surface, substantially as described.

8. In a phonograph reproducer, the combination of a stylus lever, a stylus carried thereby, a diaphragm, a connection between the same and said lever, supporting means, a member rotatably mounted in said means contacting the upper surface of said lever and serving as a fulcrum for the latter when the stylus engages a record, said means being adapted to be rotated by said lever, and means for supporting said lever when not engaging a record, substantially as described.



9. In a phonograph reproducer, the combination of vibratory means, a stylus lever, a stylus carried by said lever, means connecting said lever to said vibratory means, means for supporting said lever when said stylus is not in engagement with a record, said supporting means being inoperative when said stylus is in engagement with the record, and a member contacting said lever and serving as a fulcrum for the latter when the stylus engages the record, said lever having rocking engagement with said member in a plane passing through the latter and through the longitudinal axis of said lever and having rolling engagement with said member in a direction transverse to said lever, substantially as described.
10. In a phonograph reproducer, the combination of vibratory means, a stylus lever, a stylus carried thereby, means connecting said lever to said vibratory means, and a member contacting the upper surface of said lever and serving as a fulcrum for the latter when the stylus engages a record, said lever having rocking and rolling engagement with said member in planes at an angle to each other and to said diaphragm and oscillatory movement with respect to said member in a direction substantially parallel to said diaphragm, substantially as described.
- This specification signed and witnessed this 26th day of October 1909.
- THOS. A. EDISON.
- Witnesses:  
DYER SMITH,  
JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





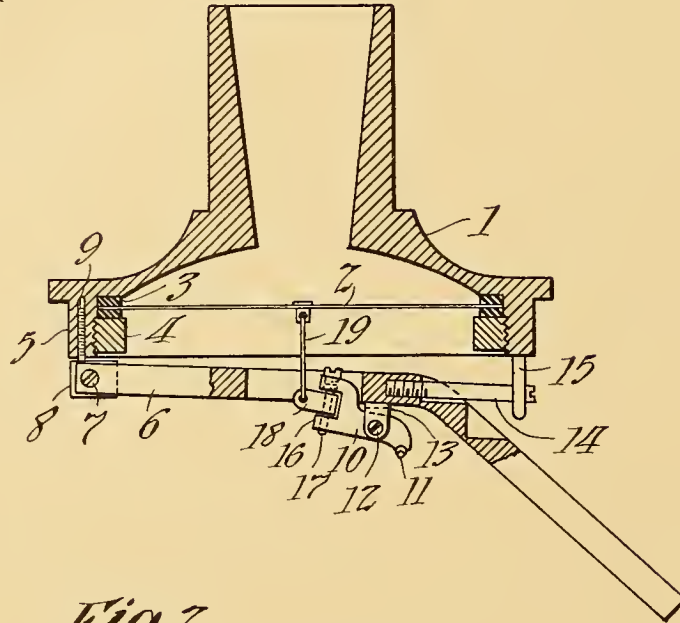


T. A. EDISON.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED OCT. 28, 1909.

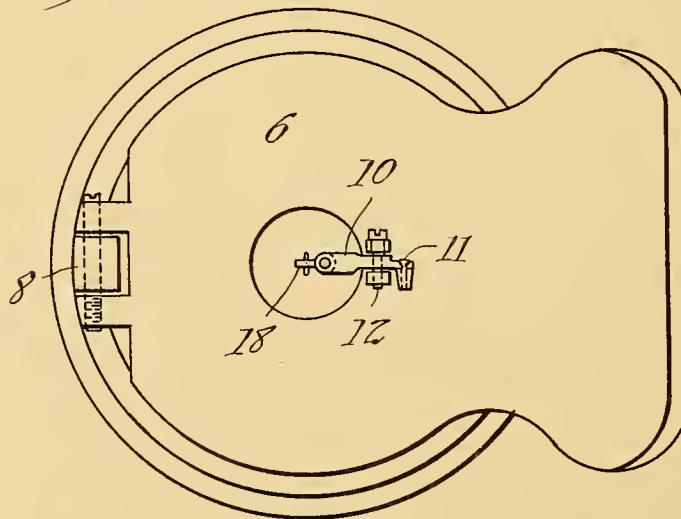
1,099,347.

Patented June 9, 1914.

*Fig. 1*



*Fig. 2*



*Witnesses:*  
 Frank D. Hewis  
 Dyer Smith

*Inventor:*  
 Thomas A. Edison,  
 by Frank R. Dyer  
 His Att'y.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,099,347.

Specification of Letters Patent.

Patented June 9, 1914.

Application filed October 28, 1909. Serial No. 525,062.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex  
5 county, New Jersey, have made certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers, and has for its object the provision of a mounting for the stylus lever and connections between the same and the diaphragm, whereby the stylus may have great freedom of movement in tracking the  
15 grooves of the record.

More particularly, the object of my invention is to provide a connection between the stylus lever and the diaphragm or other sound reproducing vibratory means, whereby the free movement of the stylus lever in  
20 a lateral direction while the stylus is tracking the record will not be impeded.

In the type of reproducer well known in the art, the tail of the stylus lever is connected to the center of the diaphragm by a link which is ordinarily a piece of wire which must have a certain amount of stiffness. When the stylus in tracking the record groove, is caused to move laterally by the undulations thereof, the stylus lever can only swing in a lateral direction by bending or twisting the connecting link. This imposes resistance to the movement of the stylus lever, and likewise, the link is apt to  
25 be twisted or the diaphragm put under undesirable stress. My improvement is designed to obviate this by providing a connection between the tail of the stylus lever and the link, whereby the link will be allowed to maintain its vertical position during lateral movement of the stylus lever, while, at the same time, the up and down movement of the lever resulting from the tracking of the stylus over the bottom of the  
40 sound groove is transmitted unimpaired to the diaphragm. This is accomplished by means of a member interposed between the stylus lever and the link, which member is pivoted to swing in a lateral plane during  
45 lateral movement of the stylus lever. Preferably, this member is pivoted at one end upon a pin which occupies a vertical plane through the tail of the stylus lever, the

member being connected at its other end to the lower end of the link. 55

The stylus lever is pivotally mounted in a manner to allow considerable freedom of movement in a plane transverse to the record groove, whereby that facility of movement of the stylus lever which is particularly important in the case of the tracking  
60 of a record having 200 threads or a greater number of threads per inch is attained.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings, illustrating a preferred form thereof, in which— 65

Figure 1 is a central vertical section through a reproducer equipped with my invention, certain parts being shown in side  
70 elevation; and Fig. 2 is a bottom plan view thereof.

Referring to the drawings, the usual sound box 1 is provided with a diaphragm 2, which is clamped between gaskets 3, the whole being held in place by a ring 4 which is threaded within flange 5 of sound box 1 in the usual manner. Floating weight 6 is pivoted at 7 to the block 8, which is supported from flange 5 by pin or screw 9, as  
75 is common. Stylus lever 10 carries stylus 11, the lever being pivoted on stud 12 which is supported in lugs 13 depending from floating weight 6. Lever 10 is mounted upon stud 12 with a somewhat loose fit, that is, in  
80 such a manner that the lever may rock through a slight arc laterally upon its pivot, or may move bodily a slight distance axially thereof. The lever 10 might be pivotally mounted in any other manner by which piv-  
90 otal movement of the same in a plane transverse to the record groove is permitted. Pin 14 extending from the floating weight, is supported within stirrup 15 depending from flange 5 of the sound box to sustain the  
95 floating weight when the stylus is not in engagement with the sound record, as is common. Stylus lever 10 is preferably formed at its rear end with the upper and lower rearwardly projecting lugs 16. Screw 17 ex-  
100 tends through these lugs, being threaded in one or both of the same and occupying a substantially vertical plane. The short link or member 18 extends longitudinally of lever 10 and is pivotally mounted at one end there-  
105 of upon the pin 17, member 18 being pro-



vided at its other end with a hole through which the lower end of link 19 is secured, link 19 being attached at its other or upper end to the center of diaphragm 2 in any usual manner. The parts are so placed and positioned that the link 19, when connected to member 18, lies substantially in the axis of the sound box. Projections 16 on lever 10 extend above and below member 18 so closely adjacent to the same that no motion is lost in transmitting the movement of stylus 11 in a vertical plane to diaphragm 2, while at the same time, member 18 may rock freely in a lateral direction upon pin 17 without binding. When, in the operation of reproducing, stylus 11 is diverted laterally in the sound groove, member 18 is swung about its pivot by the lateral movement of lever 10, link 19, accordingly, not being bent or put under stress.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph, the combination of a diaphragm, a stylus lever, a support for said lever comprising a pivot on which said lever is mounted for movement up and down in and transverse to the record groove, a stylus carried by said lever, a member connected to and extending longitudinally of said lever, said member being mounted for lateral move-

ment relatively to said lever, and a link connecting said member to said diaphragm, substantially as described.

2. In a phonograph, the combination of a diaphragm, a stylus lever, a support for said lever comprising a pivot on which said lever is mounted for movement up and down in and transverse to the record groove, a stylus carried by said lever, a member connected to and extending longitudinally of said lever, said member being mounted for lateral pivotal movement relatively to said lever, and a link connecting said member to said diaphragm, substantially as described.

3. In a phonograph, the combination of a diaphragm, a floating weight, a stylus lever mounted on said floating weight for movement up and down in and transverse to the record groove, a stylus carried by said lever, a member connected to and extending longitudinally of said lever, said member being mounted for lateral movement relatively to said lever, and a link connecting said member to said diaphragm, substantially as described.

This specification signed and witnessed this 26th day of October 1909.

THOS. A. EDISON.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

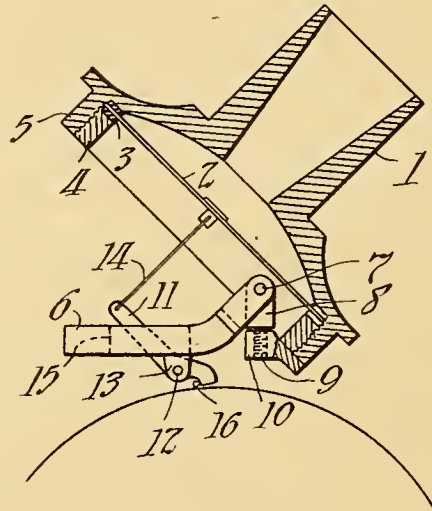




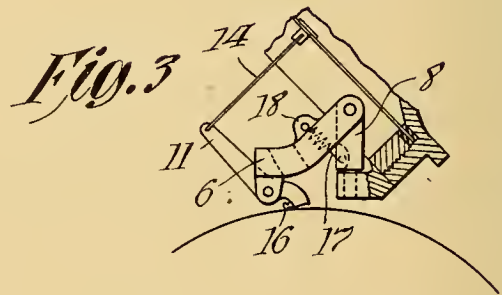
T. A. EDISON.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED OCT. 29, 1909.

1,099,348.

Patented June 9, 1914.

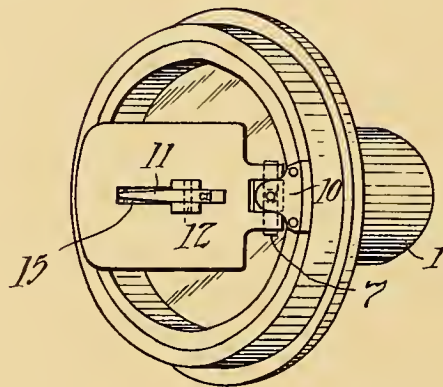


*Fig. 1*



*Fig. 3*

*Fig. 2*



*Witnesses:*  
 Frank D. Lewis  
 Dyer Smith

*Inventor:*  
 Thomas A. Edison  
 by Frank L. Dyer  
 His Atty.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-REPRODUCER.

1,099,348.

Specification of Letters Patent.

Patented June 9, 1914.

Application filed October 29, 1909. Serial No. 525,333.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex  
5 county, New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers and has for its objects the provision of means whereby an improved volume and quality of reproduction may be obtained with the use of a floating weight of the same or less weight than that used at  
15 present, the weight being so mounted and constructed that the fulcrum of the stylus lever may be placed nearer to the stylus than would otherwise be possible without greatly increasing the weight imposed upon the  
20 stylus to hold it down to its work and consequently wearing the record to a degree which would be prohibitive in the case of records made of the usual compositions. By thus rendering possible an increased leverage for the stylus a greater amplification is  
25 obtained.

In my experiments, using a phonograph reproducer having the stylus lever pivoted in the usual manner from a floating weight  
30 pivoted in the manner well known in the art, I attempted to increase the loudness of the reproduction by moving the pivotal point of the stylus lever nearer to the stylus, whereby the amount of amplification of the  
35 sound vibrations should be increased, and consequently, the loudness of the reproduction. On increasing the ratio of the leverage of the stylus lever beyond a certain point, however, I found that the reproduction did  
40 not increase in volume because of the increased work imposed upon the stylus and the consequent tendency to lift the floating weight. To overcome this difficulty, I have designed the construction embodying the  
45 subject matter of this application, in which the reaction of the pivot of the stylus lever due to the lifting of the stylus by the undulations of the record groove is exerted chiefly in a plane occupied by both the stylus  
50 lever pivot and the floating weight pivot, so that this thrust or reaction, being exerted against the immovable floating weight pivot, has but little tendency to lift the weight.

The construction is such, however, that eccentricities in the record will lift the floating weight in order that the diaphragm shall not be affected by these irregularities.

Other objects of my invention comprise the details of construction and combinations of parts more fully hereinafter described  
60 and claimed, and which tend to promote the above mentioned general object.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings, illustrating a preferred form thereof, in which  
65 Figure 1 is a central vertical section through a reproducer equipped with my invention, certain parts being shown in side elevation. Fig. 2 is a bottom plan view thereof; and  
70 Fig. 3 is a partial sectional and elevational view similar to Fig. 1 illustrating a modification of my invention.

Referring to the drawings, the usual sound box 1 is provided with diaphragm 2  
75 which is clamped between gaskets 3, the whole being held in place by a ring 4 which is threaded within flange 5 of sound box 1 in the usual manner. The floating weight  
6 is pivoted at 7 to a member 8 which occupies a substantially vertical position, and has formed integral therewith a portion 9  
80 of reduced diameter, which is screw threaded within a member 10 having a correspondingly threaded opening, and which member  
85 10 is secured in any suitable manner to the bottom of flange 5 of the sound box body 1. By this construction, floating weight 6 is free to oscillate in a vertical plane about its pivot  
90 7, and also in a horizontal plane about its vertical pivot 9. The member 8 is directed upwardly from its base, so that horizontal pivot 7 is near the diaphragm and well inside of flange 5 of the sound box 1. The  
95 floating weight, instead of occupying a plane substantially parallel to the diaphragm, as in the usual construction, extends downwardly from its pivot at a considerable angle to the diaphragm. Preferably, the portion of the floating weight  
100 nearest to the pivot is so mounted that it extends practically at right angles to the diaphragm.

Stylus lever 11 is pivoted at 12 to lugs 13 depending from the floating weight 6, or the  
105 stylus lever may be pivotally connected to



the floating weight in any other desirable manner. The tail of lever 11 is connected to the center of diaphragm 2 by the usual link 14. In the construction shown in the

5 drawings, stylus lever 11 is positioned substantially parallel to diaphragm 2, and accordingly, its arm between pivot 12 and link 14 extends through a passageway 15 in floating weight 6.

10 Preferably, as shown, pivot 12 of the stylus lever lies in approximately the same plane substantially at right angles to stylus lever 11 and diaphragm 2 as pivot 7 of floating weight 6. Also, preferably, floating

15 weight 6 is bent at a point nearly above stylus 16 carried by stylus lever 11, or at such a point that pivot 12 of the stylus lever supported by lugs below the bent portion of the weight lies approximately in the median

20 plane of weight 6 through pivot 7, so that the tail of the floating weight, or the part thereof extending substantially from this point to the outer end of the weight, extends in a plane which is substantially parallel to

25 the tangent to the record through the stylus. The essential point is that the reaction on pivot 12 of the stylus lever due to the sound undulations of the record groove, shall be

30 exerted in the direction of pivot 7 of the floating weight 6, or a large component of this reaction shall be so exerted. At the same time, floating weight 6 must perform its well known functions as a floating weight

35 when the stylus passes over eccentricities in the record. These objects are all attained in the construction shown in the drawings. Here, stylus lever 11 is practically parallel with the diaphragm, and link 14 and the upper portion of floating weight 6 are sub-

40 stantially at right angles to diaphragm 2. The reaction of pivot 12 in the operation of stylus 16 is substantially all directed toward pivot 7. A plane passing through the axis of the record and through stylus 16 of pivot

45 12, however, intersects the plane including pivots 7 and 12 at a considerable angle. Accordingly, it will be seen that as a result of stylus 16 passing over eccentricities or other inequalities in the record of considerable

50 magnitude as compared to the hills and valleys of the sound record, floating weight 6 will be lifted and the diaphragm 2 not affected by these irregularities. As a result of this construction, the fulcrum of the

55 stylus lever can be brought as close to the end of the lever bearing the stylus as is desired, and the amplification correspondingly increased, it being only necessary that wherever the fulcrum is placed, the floating

60 weight be so positioned and shaped that the thrust of the lever pivot is directed substantially in the line of the weight pivot. Incidentally, I have found in practice that good results may be obtained with the use of a

65 floating weight mounted as shown in the

drawings, considerably lighter than the weights necessary under the former practice, whereby the wear on the record and stylus is lessened.

Another beneficial result which, it is to be 70 noted, accrues from the positioning of stylus lever 11 at a considerable angle to the tangent to the record through the stylus, is that friction between the stylus and the record being exerted tangentially tends to turn the 75 stylus lever about its pivot, and aids in producing a louder reproduction. In the case of a stylus lever mounted in the usual manner, in a plane substantially parallel to the tangent to the record, the friction as the stylus 80 ascends a hill in the record merely pulls on the lever pivot, and creates practically no turning effect on the lever. In my present invention it does exert a turning effect on the lever, and this is one of the factors en- 85 abling me to increase the leverage of the stylus in this construction. It is also to be noted that the construction illustrated constitutes a parallel-motion or pantograph, the link 14 and the portion of the floating 90 weight between the two pivots always being substantially parallel.

In the modification shown in Fig. 3, a spiral spring 17 is interposed between a lug 18 on floating weight 6 and member 8 to 95 assist in holding stylus 16 down to its work. When this spring is used, it is, of course, obvious that the mass of floating weight 6 need not be so great as in the former case. In the claims, the term "floating weight" is used 100 to denote a member having the well known functions of a floating weight and actuated by either gravity or a spring, or both.

Having now described my invention, what I claim and desire to protect by Letters Pat- 105 ent is as follows:

1. In a device of the class described, the combination with a vibratory member, of a floating weight pivoted near said vibratory member for movement about a horizontal 110 axis, an amplifying stylus lever pivoted to said weight, and a link connecting said lever and said vibratory member, said lever and said member being normally approximately parallel, and said link being substantially 115 parallel to a line containing the centers of the pivots of said weight and lever, substantially as described.

2. In a phonograph reproducer, the combination of a diaphragm, a floating weight 120 pivoted adjacent to said diaphragm, a stylus lever pivoted to said weight, a stylus carried by said lever, and a connection from said lever to said diaphragm, said weight having a portion extending directly from its pivotal 125 point toward said stylus lever pivot at a sharp angle to the tangent to the record at the point of contact of said stylus, and having a second portion extending in a plane more nearly parallel to said tangent, said 130

lever being pivoted substantially at the intersection of said portions of said weight, substantially as described.

5 3. In a phonograph reproducer, the combination with a sound box body and a diaphragm therein, of a floating weight pivoted to said body, a stylus lever pivoted to said weight and extending therethrough, and connections between said lever and diaphragm, said weight extending directly from its pivot toward that of said lever in a direction approximately at right angles to said diaphragm and having an extension beyond the pivot of said lever, substantially as described.

15 4. In a device of the class described, in combination, a stylus lever, a stylus carried

thereby, a vibratory member substantially parallel to said lever, a connection between said member and said lever, and means pivoted near said vibratory member for movement about a horizontal axis and pivotally supporting said lever at a point between said stylus and said connection, the pivots of said lever and said supporting means being located in a plane substantially parallel to said connection, substantially as described.

This specification signed and witnessed this 28th day of October 1909.

THOS. A. EDISON.

Witnesses:

DYER SMITH,  
H. H. DYKE.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."







W. C. FUHRI.  
CABINETED GRAPHOPHONE.  
APPLICATION FILED JULY 16, 1910.

1,099,353.

Patented June 9, 1914.

2 SHEETS—SHEET 1.

Fig. 1

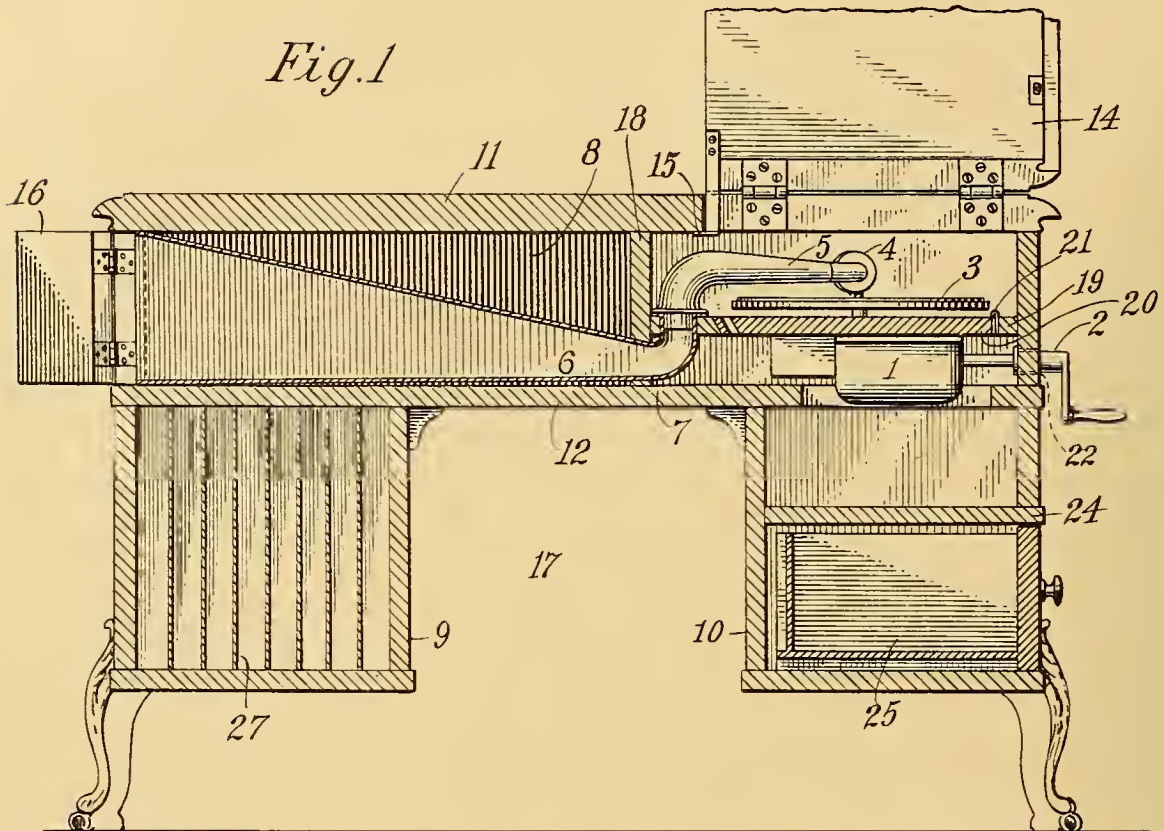
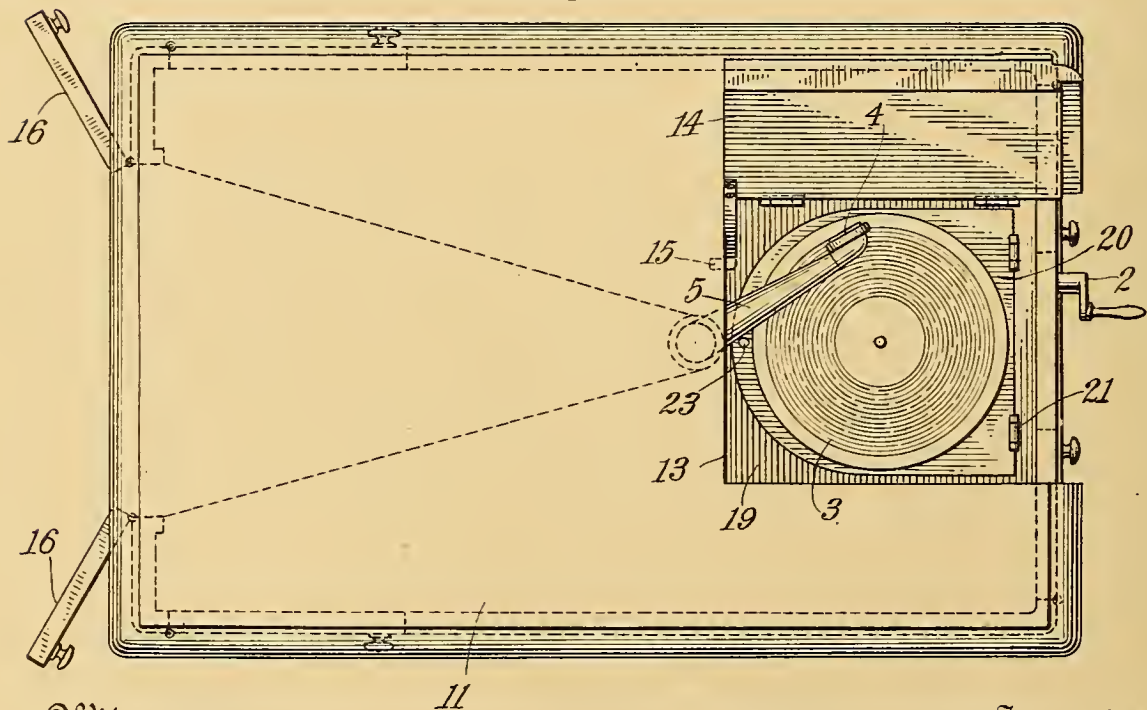


Fig. 2



Witnesses:  
Lillie E. Herens  
M. A. Hook

Inventor  
William C. Fuhri  
By his Attorneys  
Lawrence Cameron, Lewis & Hession



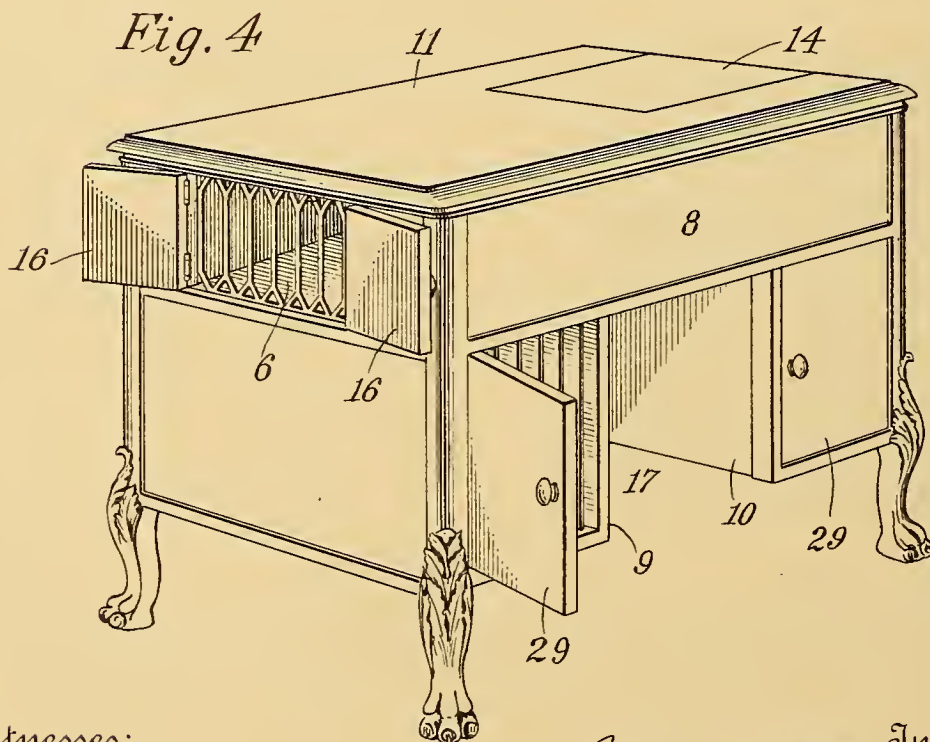
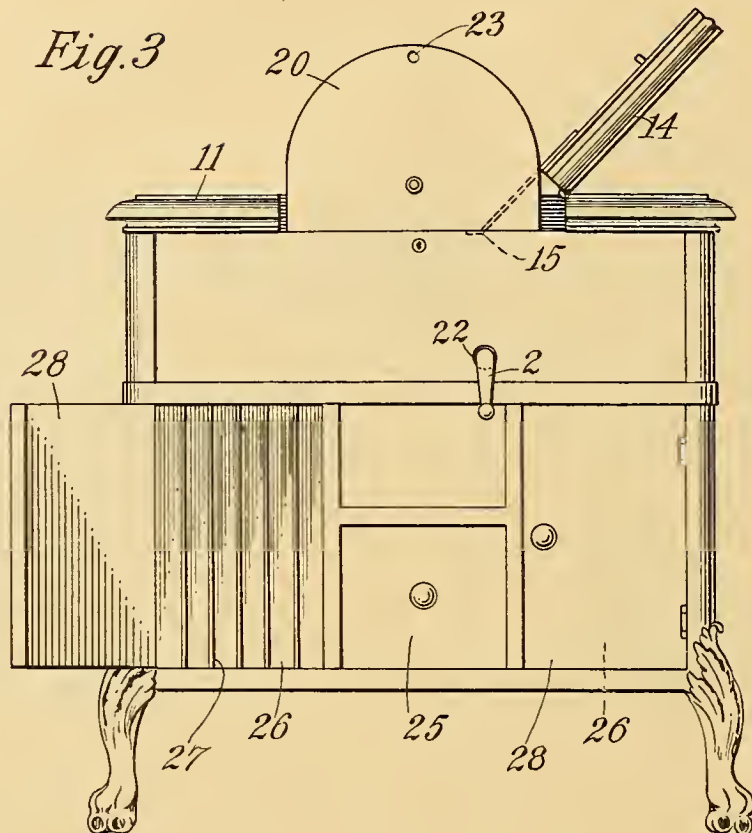


W. C. FUHRI.  
CABINETED GRAPHOPHONE.  
APPLICATION FILED JULY 16, 1910.

1,099,353.

Patented June 9, 1914.

2 SHEETS—SHEET 2.



Witnesses:  
Lillie E. Hergeus  
M. A. Hood.

Inventor  
William C. Fuhri.  
By *Hubert Attorney S.*  
*Mawra, Cameron, Lewis & Hassen*

# UNITED STATES PATENT OFFICE.

WILLIAM C. FUHRI, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## CABINETED GRAPHOPHONE.

1,099,353.

Specification of Letters Patent.

Patented June 9, 1914.

Application filed July 16, 1910. Serial No. 572,337.

*To all whom it may concern:*

Be it known that I, WILLIAM C. FUHRI, a citizen of the United States of America, and a resident of Chicago, Illinois, have invented a new and useful Improvement in Cabineted Graphophones, which improvement is fully set forth in the following specification.

My invention relates to talking-machines, particularly graphophones, and consists of an improved "cabineted graphophone", that is, the combination of a graphophone and an ornamental and useful casing or cabinet which contains and completely incloses the former.

The object of the invention is to provide an article which is in itself serviceable as an attractive piece of furniture, yet at the same time constitutes a self-contained talking-machine of superior quality.

Although cabineted talking machines have been known and used, yet my present invention is a marked improvement over all such prior machines known to me, in utility and attractiveness of appearance as an article of furniture, and without any sacrifice of acoustical properties as a talking-machine, besides providing ready access for oiling or cleaning the mechanical parts, repairing them, etc.

Broadly stated, the invention comprises the combining of a graphophone in operative relation with a so-called library-table, which latter may be defined as of inverted U-shape with flat top.

The invention comprises further the utilization of the two cubical portions of the library table, one beneath each end thereof, to support and give rigidity to the upper horizontally-elongated casing which contains the talking-machine, and also to provide between themselves the knee-space which adapts the article for use as a library table.

The invention comprises further the utilization to the fullest extent of the available spaces in said library table, for suitably locating the sound-reproducing and sound-conveying parts and the motor-mechanism of the graphophone, and for storing a supply of sound-records, etc.

The invention further comprises a movable support for the graphophone, for giving ready access to the sound-reproducing parts and to the mechanism, for oiling, repairs, or the like, while normally incasing and protecting said parts. And, finally, the invention comprises the combinations of the foregoing features, and also the various details of construction, location, and arrangement of the several parts, as hereinafter more particularly set forth and claimed.

The invention will be best understood by reference to the accompanying drawings which illustrate a preferred embodiment thereof.

In these drawings: Figure 1 is a vertical section, taken longitudinally through the cabineted graphophone; Fig. 2 is a plan view, the lid being open to expose the turntable of the graphophone; Fig. 3 is an elevation, viewed from one end of the table, the motor being represented as raised for inspection (from the other side); Fig. 4 is a perspective, viewed from the opposite end of the table.

Referring more particularly to Fig. 1, 1 represents the motor-mechanism of the graphophone or other talking-machine, here indicated as clock-work actuated by a spring-motor that is adapted to be wound up by a detachable crank-key 2. 3 is the detachable horizontal turn-table rotated from the motor by means of any convenient or well-known gearing (not shown). 4 is the sound-box, equipped with the usual reproducing-stylus, and carried by the swinging arm 5, here shown as a tapering tube or "tone-arm" swiveled to swing horizontally and thereby carry sound-box 4 in operative relation across a sound-record upon turn-table 3. 6 is the sound-conveyer, here shown as a flaring "horn" (preferably of thin wood, and owing to the shape of the confining compartment it is preferably of greater width than height in cross-section, as indicated in Fig. 4). This horn communicates with tone-arm 5 by means of the elbow 7; the joint between the conveyer and the tone-arm 5 being preferably rendered as air-tight as feasible, so that the



sound-waves from the diaphragm of the sound-box shall pass, without loss, through the continuous conduit 5—7—6, to escape at the outer end of the latter.

5 The preferred form and arrangement of casing or cabinet, for containing and inclosing the graphophone, comprises the horizontally-elongated upper portion 8 (Fig. 4) and the two lower portions or boxes 9 and 10. This upper portion is a casing outlined by the flat top 11 and floor 12, with suitable vertical sides and end-pieces. The top is cut away at 13 (Fig. 2) to give access to the "well" where the graphophone is located, and is provided with hinged lid 14 having the stop 15; and the opposite end-piece has an opening, which may be provided with hinged doors 16, for the discharge of sound from the adjacent end of horn 6. The two lower portions 9 and 10 are shown as cubical boxings or cabinets, located one beneath each end of the upper casing 8 to support the upper casing and give rigidity to it, and to provide the knee-space 17 between themselves, thereby constituting with the upper casing the attractive and ornamental library table, which may be provided with feet, all as seen in Fig. 4.

The preferred manner of mounting and combining the graphophone with the cabinet is as follows: 18 is a vertical partition extending transversely across the upper casing 8, dividing the same into two compartments; the longer compartment contains and incloses the longitudinally-extending horn 6, while the shorter compartment constitutes the "well" for the graphophone. This smaller compartment is itself divided into an upper and a lower chamber, by a horizontal shelf 19 that has a large D-shaped cut-away portion; this shelf serves as a stationary support for the movable support of the graphophone, and also provides the fixed bearing for the sound-conveyer or tone-arm. 20 is the movable support for the graphophone. It is shown as a trap-door corresponding to the cut-away, and hinged by its straight edge, at 21, upon the corresponding straight edge of said cut-away, while its free end rests upon a bevel or other ledge of the stationary shelf. The motor-mechanism 1 is secured to the lower face of this movable support 20, and depends therefrom into the lower chamber of this end of the casing; while the (detachable) turn-table 3 is located above the trap-door. Floor 12 may be cut away beneath the graphophone, to provide additional space for the motor-mechanism. The inner end of conveyer 6 fits snugly in or against (and may protrude slightly through) an aperture in the lower portion of vertical partition 18, where elbow 7 is united to it; and the other end of elbow 7 connects in

similar manner with an aperture in shelf 19, above which is swiveled the movable conveyer or tone-arm 5. The outer end of the conveyer or horn 6 preferably extends flush to the opening in the end of casing 8, so as to preclude the admission of dust, moisture, etc., into the inclosed space surrounding horn 6.

When a spring-motor is employed, the winding-key 2 is inserted through a suitable opening 22 in the end wall of the cabinet. The sound-reproducing devices are readily accessible by raising the lid 14 until its stop 15 engages beneath top 11; and access to the motor-mechanism is afforded by first removing turn-table 3, and key 2, and then lifting trap door 20, as by inserting the finger in a hole 23.

24 is a horizontal partition located in boxing 10, beneath the depending motor-mechanism; and the available space beneath this partition may be fitted with a drawer, as 25, the partition 24 preventing grease, etc., dropping into the drawer. Should an electric motor be employed, the space above partition 24 is available for that purpose. Spaces 26—26 on either side of the drawer 25 and the motor, as well as the space in the other cubical boxing 9, provide room for storing a supply of sound-records, and may be equipped with vertical spacers 27. 28—28 and 29—29 are doors for these spaces.

The cased graphophone thus constructed is in itself a handsome and useful library table, available for the purpose to which such article is usually put; and at the same time it is a completely equipped and self-contained talking-machine, which affords ready access for operating the machine and provides storage for a large quantity of sound-records and other supplies. The boxings 9 and 10 give rigidity to the table as a whole; they support the upper longitudinal compartment 8 at a suitable height for use as a talking-machine and as a library table; one of them provides any additional space necessary for the motor mechanism etc.; and they both provide space for storing records etc. Moreover, besides accomplishing all of these usual purposes, there is no sacrifice in appearance or in acoustical properties; but on the contrary I have produced a most handsome and attractive article of furniture, and a cased graphophone which is remarkable for the sweetness and quality of its reproductions.

Although I have described my invention with some particularity of detail, yet this is merely for the sake of clearness, since my invention is not limited to the precise construction, arrangement, and location of the several parts, which may be varied considerably, and some of these parts may be used to the exclusion of others, without departing



from the spirit of my invention. For instance, vertical partition 18 might be omitted, or, instead of trap door 20 and shelf 19, any other suitable supports for the graphophone and for the tone-arm might be employed, as a fixed bracket for the latter and for the former any movable base plate adapted to rest upon ledges in the "well"; and many other modifications might be resorted to in this and other parts of the apparatus.

Having thus fully described my invention, and the preferred embodiment thereof, I claim:

1. A cabineted graphophone, comprising a horizontally-extending casing, a longitudinally-extending and stationary sound-conveyer inclosed therein and delivering toward an opening in one end thereof, a graphophone with its motor-mechanism and turn-table movably supported and inclosed in the other end of said casing, and a swinging sound-conveyer communicating with said stationary conveyer and at its other end carrying a sound-box in operative relation to said turn-table.

2. A cabineted graphophone, comprising an upper horizontally-extending casing, a longitudinally-extending and stationary sound-conveyer inclosed therein and delivering toward an opening in one end thereof, a graphophone with its motor-mechanism and turn-table movably supported and inclosed in the other end of said casing, a swinging sound-conveyer communicating with said stationary conveyer and at its other end carrying a sound-box in operative relation to said turn-table, and two supporting and spaced boxings beneath said upper casing to support the same and to provide knee-space between themselves, thereby constituting a combined library table and graphophone.

3. A cabineted graphophone, comprising a horizontally-extending casing having a vertical partition extending transversely across the same to constitute two compartments, a stationary sound-conveyer extending within one of said compartments with its outer end delivering toward an opening in the end thereof and its other end extending past said partition, and the following parts inclosed in the other compartment, viz; a movable support located horizontally on the other side of said vertical partition, motor-mechanism depending from the lower side of said support and with its turn-table located above the same, and a swinging hollow arm carrying a sound-box and communicating with the inner end of said sound-conveyer.

4. A cabineted graphophone, comprising a horizontally-extending casing having a transverse vertical partition and a ledge or stationary support in the compartment on

one side of said partition, a sound-conveyer communicating with an aperture in said ledge and thence extending through said partition and delivering toward an opening in the end of the other compartment, a movable support in the first-named compartment adapted to rest on said ledge, graphophone-mechanism depending from said movable support and having its turn-table located above the same, and a hollow arm swiveled above said aperture in said ledge to communicate with said sound-conveyer and carrying a sound-box in operative relation to said turn-table.

5. A cabineted graphophone, comprising a horizontally-extending casing having in one end a movable support, a graphophone carried by said support and with its turn-table located above the same, a tone-arm swiveled upon a stationary bearing to carry a sound-box across a sound-record on said turn-table, a sound-conveyer communicating with said tone-arm and extending longitudinally through said casing to deliver toward an opening in the end thereof, and two boxes beneath said casing, one located beneath each end thereof, to support the same and to provide knee-space and thereby constituting a combined library table and graphophone.

6. A cabineted graphophone, comprising a cabinet in the form of an inverted U with flat top, consisting of two inclosed boxings spaced apart to provide knee-space and supporting an upper transverse compartment, in combination with the sound-reproducing devices of a graphophone inclosed within said transverse compartment, and motor-mechanism depending from said graphophone into one of said supporting boxes.

7. A cabineted graphophone comprising a casing having a vertical partition, a stationary support on one side of said partition, a sound-conveyer having one end mounted in said support and thence extending past said partition and delivering toward an opening in one end of said casing, a hinged member adapted to rest on said stationary support, graphophone mechanism depending from said hinged member, a hollow arm communicating with the end of said sound-conveyer in said stationary support, and a sound-box carried by said arm.

8. A cabineted graphophone comprising a horizontally extending casing, a vertical partition extending transversely across said casing and forming two compartments, a sound-conveyer extending within one of said compartments and having its outer end delivering toward an opening in one end of said casing, and the following parts inclosed in the other compartment, viz: a horizontal stationary support having an aperture for receiving the inner end of said sound-conveyer, a movable member adapted to rest on

said stationary support, motor mechanism  
depending from the lower side of said mov-  
able member, a swinging hollow arm com-  
municating with the inner end of said  
5 sound-conveyer, and a sound-box carried by  
said arm.

In testimony whereof I have hereunto set

my hand in the presence of two witnesses  
this 13th day of July, 1910.

WILLIAM C. FUHRI.

Witnesses:

C. A. L. MASSIE,

WILLARD H. HARTING.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

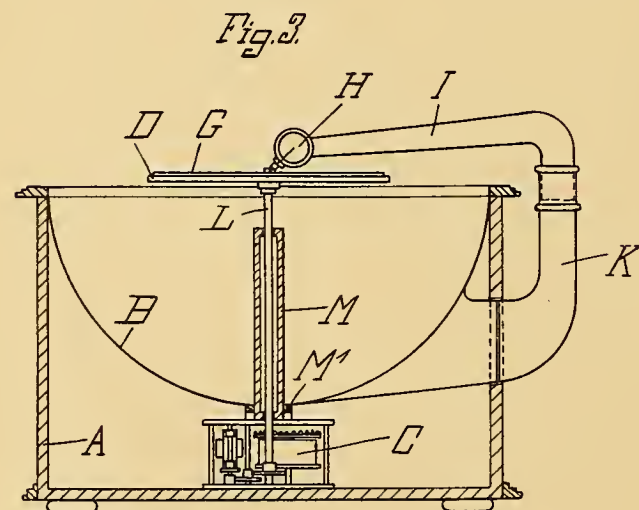
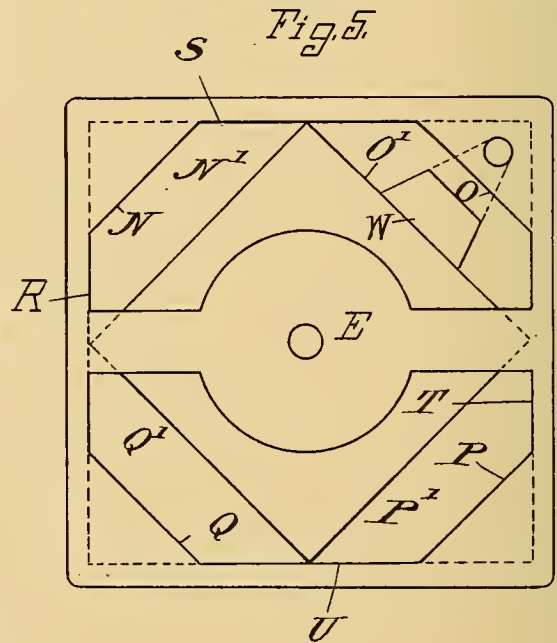
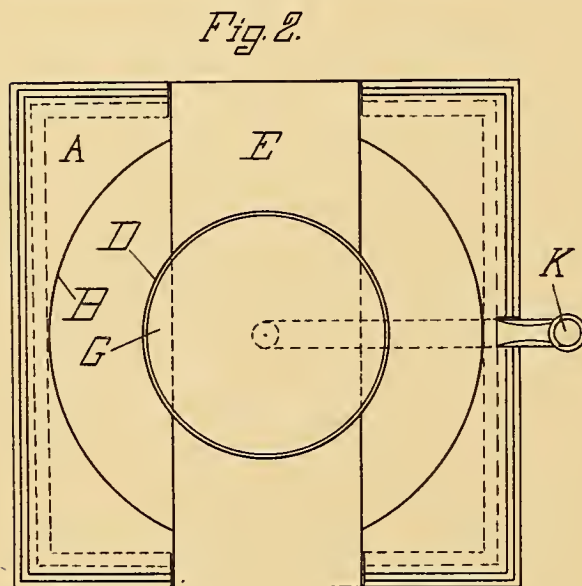
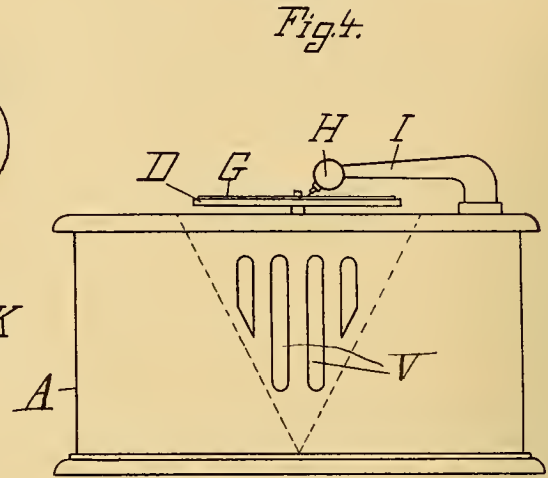
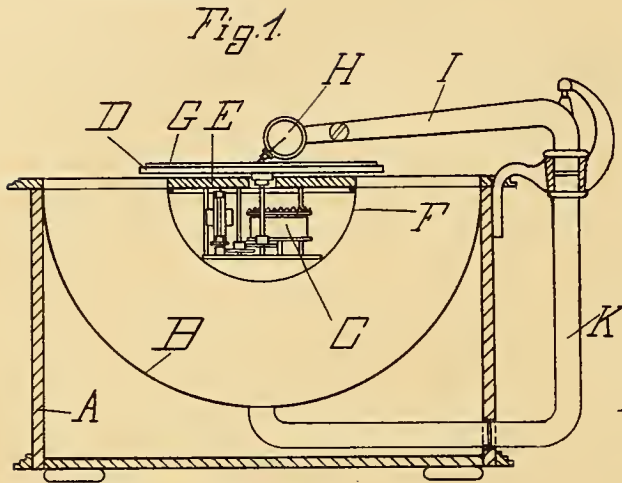




K. A. MAURER.  
 GRAPHOPHONE AND TALKING MACHINE.  
 APPLICATION FILED MAY 3, 1910.

1,099,458.

Patented June 9, 1914.



Witnesses:  
 Corinne Myers.  
 James C. Coggin

Inventor:  
 Karl A. Maurer,  
 by L. K. Böhm,  
 Attorney.

# UNITED STATES PATENT OFFICE.

KARL A. MAURER, OF LEIPZIG, GERMANY, ASSIGNOR TO POLYPHON-MUSIKWERKE  
AKTIENGESELLSCHAFT, OF WAHREN, NEAR LEIPZIG, GERMANY.

## GRAPHOPHONE AND TALKING-MACHINE.

1.099,458.

Specification of Letters Patent.

Patented June 9, 1914.

Application filed May 3, 1910. Serial No. 559,170.

*To all whom it may concern:*

Be it known that I, KARL A. MAURER, a citizen of the Empire of Germany, and a resident of Leipzig, Kingdom of Saxony, Germany, have invented certain new and useful Improvements in Graphophones and Talking-Machines, of which the following is a specification.

This invention has reference to talking machines, phonographs, graphophones and the like, which are provided with a horn for the purpose of amplifying the sound. These sound amplifying horns occupy more space than the talking machine itself. If however the sound amplifying horn is located within the casing of the machine then the amplification of the sound is greatly reduced because the opening of the horn likewise must be greatly reduced to find room within the casing. These contrivances further have the disadvantage that the sound is strongly conveyed solely in the direction in which the horn is placed.

It is the purpose of the present invention to avoid the above described deficiencies and to produce a talking machine with a sound amplifier within the casing that conveys sound in all directions. This has been primarily attained by arranging the amplifying device within the casing so that its opening is at the top and by placing the motor or part of same within or before the opening of said amplifier.

The invention is illustrated in the accompanying drawing in which:

Figure 1, illustrates in side elevation partly in section a sound recording and reproducing device which embodies in desirable form the present improvements. Fig. 2 is a plan view of the same. Fig. 3, is an elevation partly in section of an apparatus in which the record support is shown to be arranged before the opening of the amplifier. Fig. 4 is a side elevation, and Fig. 5, a top plan view showing a modified form of sound amplifying device.

Similar characters of reference denote like parts in all the figures.

The casing A of the apparatus shown in Figs. 1 and 2 is a simple box which is open at the top. The sound amplifying device B is arranged within the casing A in such manner that its opening likewise is at the top.

The motor C for the record support D is

secured to a special bridge E so that it reaches into the sound amplifying device when the bridge E is placed horizontally across the casing A. The motor may be directly mounted on the bridge E or first secured to a special plate as desired.

In the form of apparatus illustrated in Figs. 1 and 2 the motor C is surrounded by a semi-spherical casing F. This answers a double purpose first, it prevents dust from entering and second, it exposes only smooth surfaces to the sound waves produced in the amplifying device B. If a record G is now placed on the record support D and the motor started then the sound is reproduced in the usual manner by means of the sound box H communicating with the arm I and the tube K conveying thus the sound into the amplifier. The large hollow body of the amplifier increases the strength of the sound and as the amplifier is open at the top the sound is conveyed uniformly in all directions.

It is immaterial whether the tube K connects with the bottom of the amplifier B or on the side. In order to have no protruding parts on the casing A the downward portion of the tube K may be mounted within the casing A as shown in Figs. 4 and 5. It is further immaterial for the purpose of the present invention whether the motor C is placed below the bridge E or above the same. In the latter case the motor will be in front of the opening of the amplifying device B. The motor may also be mounted on the bottom of the amplifier without bridge or it may be otherwise suitably supported within the amplifier leaving then the opening of the same completely free.

Fig. 3, illustrates a talking machine in which the motor C is located below the amplifying device within the casing A so that only the shaft L passes through said device and the record support D mounted thereon is above the opening of the amplifier. When the shaft L passes through the center of the amplifying device it may also be supported in a second bearing in the special plate above mentioned in relation to Figs. 1 and 2. The shaft L is suitably surrounded with a guide bearing or elongated bushing M which extends into the amplifier. At the upper end of the shaft right above the opening of the amplifier the record support D is secured which is adapted to receive the record. The



record support D may also be mounted somewhat below the opening of the amplifier so that it may be conveniently reached by the sound arm I. In this instance the tube K connects with the amplifier on the side of the same to allow of mounting the motor centrally below as shown in Fig. 3. The amplifier may also be mounted on a flange M<sup>1</sup> of the bushing M independent from the motor. The amplifier may also be entirely dispensed with if the casing A is constructed so that it possesses sufficient resonance. The motor may further be arranged alongside the amplifier and its motion transmitted to the shaft L in suitable manner.

The modified form illustrated in Figs. 4 and 5 comprises a casing A for the talking machine consisting of a four sided box which is open at the top. Within the casing there is an amplifier of octagonal form so arranged that on the four sides N, O, P, Q, there are mounted inclined sounding boards or walls N<sup>1</sup>, O<sup>1</sup>, P<sup>1</sup>, Q<sup>1</sup>, which are adapted to convey the sound in an upward direction. Between these four inclined walls there are the vertical walls R, S, T, U. However all these straight walls or part of them are cut out forming incisions V. The motor C may be mounted below the bridge E and the record support D above the same. The reproduced sound is conveyed in this construction through the sound arm I in a downward direction and enters through the opening W in the inclined wall O<sup>1</sup> into the amplifier from where it is conveyed in an upward direction and also through openings V of the side walls of the casing.

The above described arrangement of the amplifying device may be used for record plate machines as well as for cylindrical machines.

I claim as my invention:

1. In talking machines, the combination of a cabinet, a sound amplifying horn inclosed therein and having its exit end upwardly directed, a motor inclosed in a casing positioned in the exit end of said horn, a record support adapted to be rotated by said motor, and a reproducer adapted to operate upon a record carried by said support and connected to said horn, substantially as described.

2. In talking machines, the combination of a sound amplifying horn, a motor inclosed in a casing, the said casing being positioned in the exit portion of said horn so as to form an annular sound conduit therewith, a record

support adapted to be rotated by said motor, and a reproducer adapted to operate upon a record carried by said support and connected to said horn, substantially as described.

3. In talking machines, the combination of a cabinet, a sound amplifying horn inclosed therein and having its exit portion upwardly directed, a motor inclosed in a casing, the said casing being positioned in the exit portion of said horn so as to form an annular sound conduit therewith, a record support adapted to be rotated by said motor, and a reproducer adapted to operate upon a record carried by said support and connected to said horn, substantially as described.

4. In a talking machine, the combination of an amplifying sound conveyer, of a rotary record support, a casing arranged to form with said conveyer an annular sound conduit, actuating means for said support in said casing, and reproducing means communicating with said conveyer and arranged in operative relation with respect to said support, substantially as described.

5. In a talking machine, the combination of an amplifying sound conveyer, a rotary record support coaxial with the exit portion of said conveyer, a casing arranged coaxial with said support and arranged to form with the exit portion of said conveyer an annular sound conduit, actuating means for said support in said casing, and reproducing means communicating with said conveyer and arranged in operative relation with respect to said support, substantially as described.

6. In a talking machine, the combination of an amplifying sound conveyer having an upwardly directed exit portion, a rotary record support coaxial with said exit portion, a casing coaxial with said record support and arranged to form with said exit portion an annular sound conduit, actuating means for said support in said casing, and reproducing means communicating with said conveyer and arranged in operative relation with respect to said support, substantially as described.

Signed at Leipzig, Germany, this 19th day of April, 1910.

KARL A. MAURER.

Witnesses:

RUDOLPH FRICKE,  
ALBERT R. MORAWETZ.





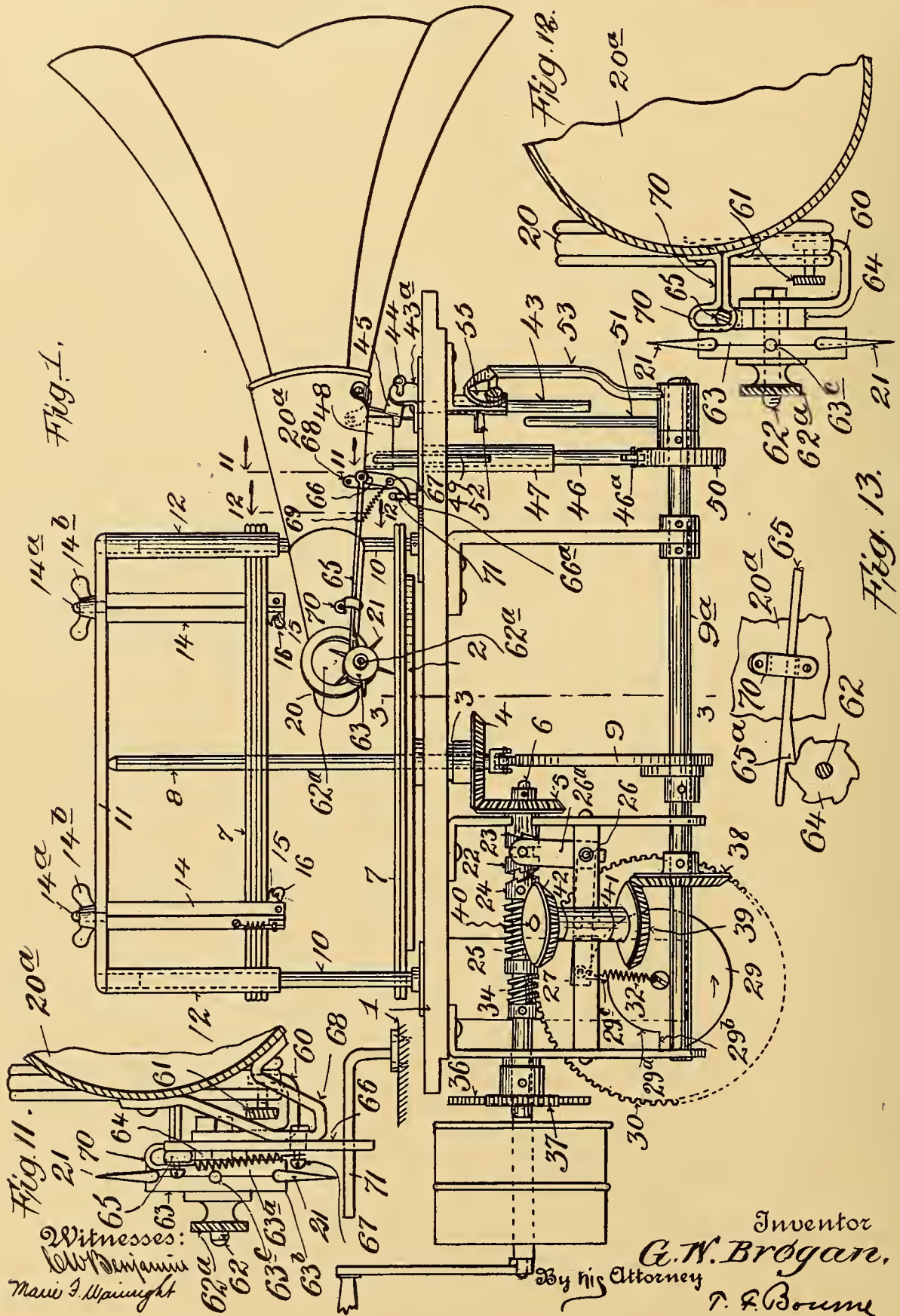
G. W. BROGAN.  
TALKING MACHINE.

APPLICATION FILED OCT. 10, 1912.

Patented June 16, 1914.

4 SHEETS—SHEET 1.

1,099,913.



Witnesses:  
Wm. Benjamin  
Marie J. Wainwright

Inventor  
G. W. Brogan.  
By his Attorney  
T. F. Bourne

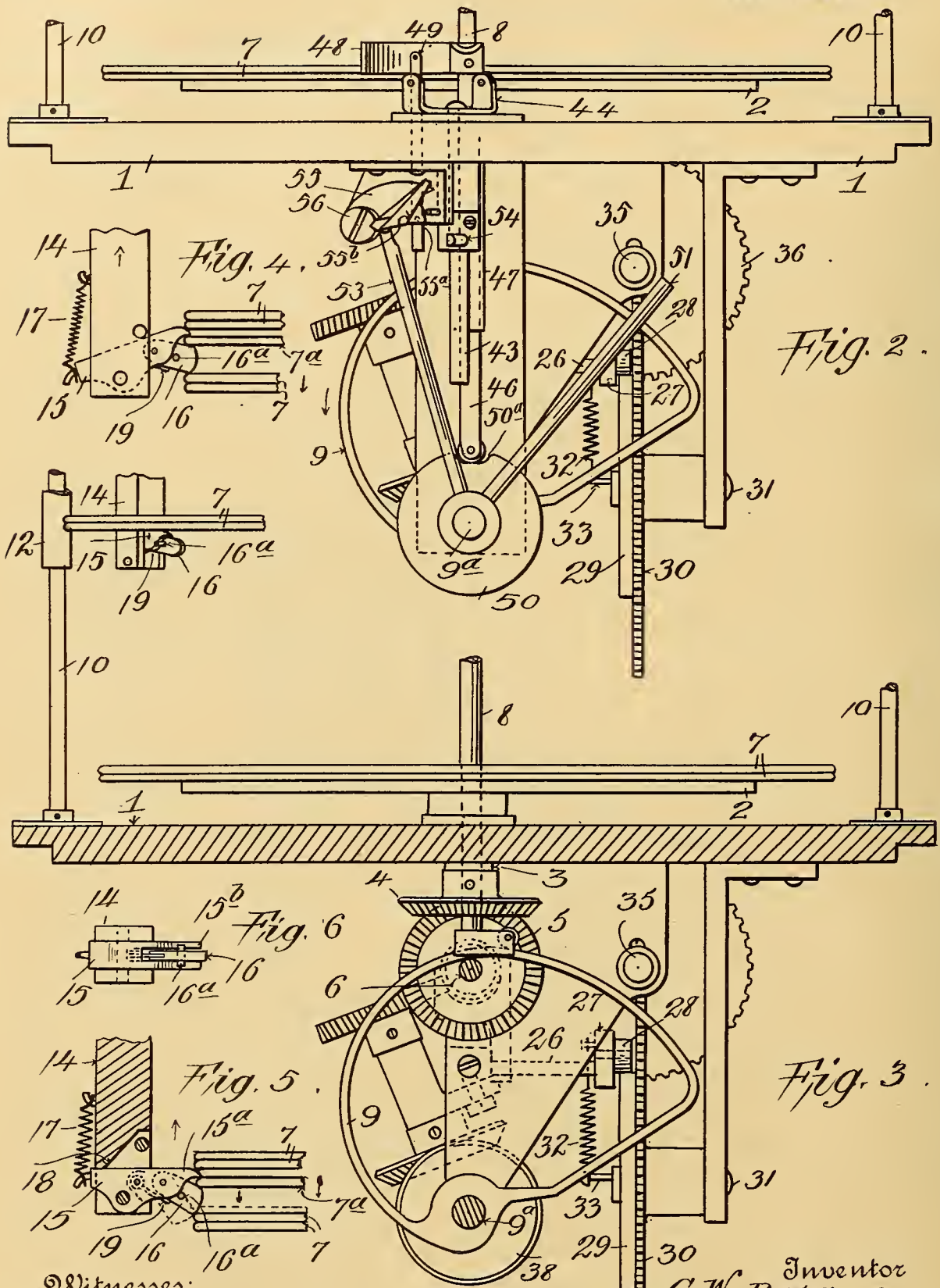




1,099,913.

Patented June 16, 1914.

4 SHEETS—SHEET 2.



Witnesses:  
J. W. Benjamin  
Marie S. H. Wright

Inventor  
G. W. Brogan.  
By his Attorney T. F. Brown



G. W. BROGAN.  
TALKING MACHINE.

APPLICATION FILED OCT. 10, 1912.

Patented June 16, 1914.

4 SHEETS—SHEET 3.

1,099,913.

Fig. 7.

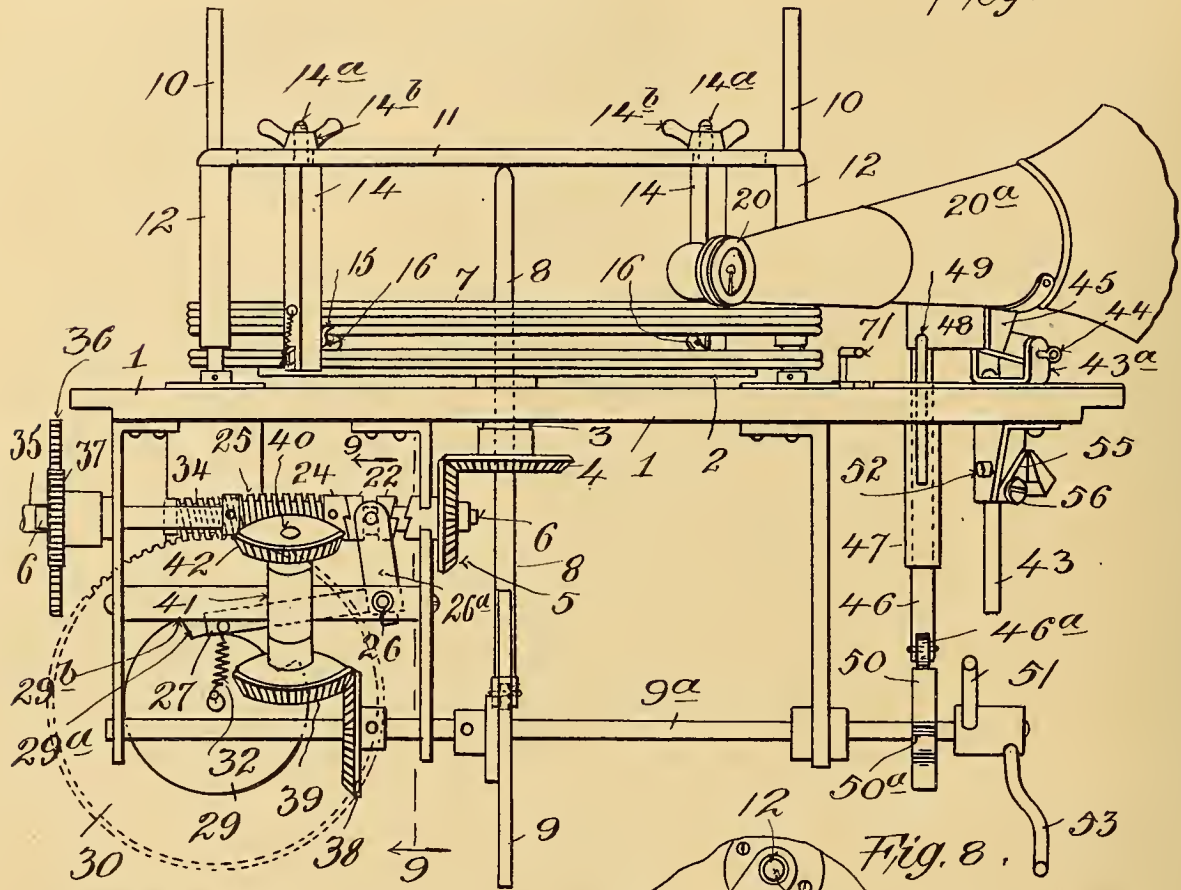
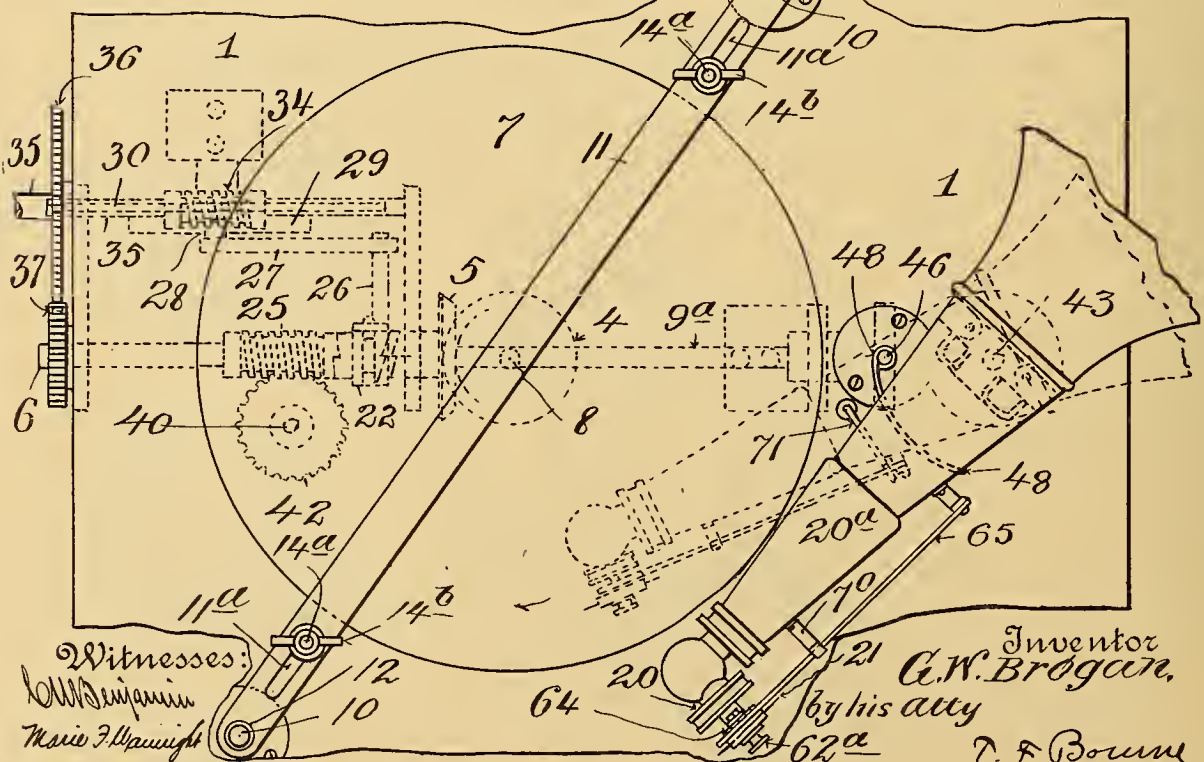


Fig. 8.



Witnesses:  
Louis Benjamin  
Marie F. Wright

Inventor  
G. W. Brogan,  
by his atty  
T. F. Bourne





G. W. BROGAN.  
TALKING MACHINE.

APPLICATION FILED OCT. 10, 1912.

Patented June 16, 1914.

4 SHEETS—SHEET 4.

1,099,913.

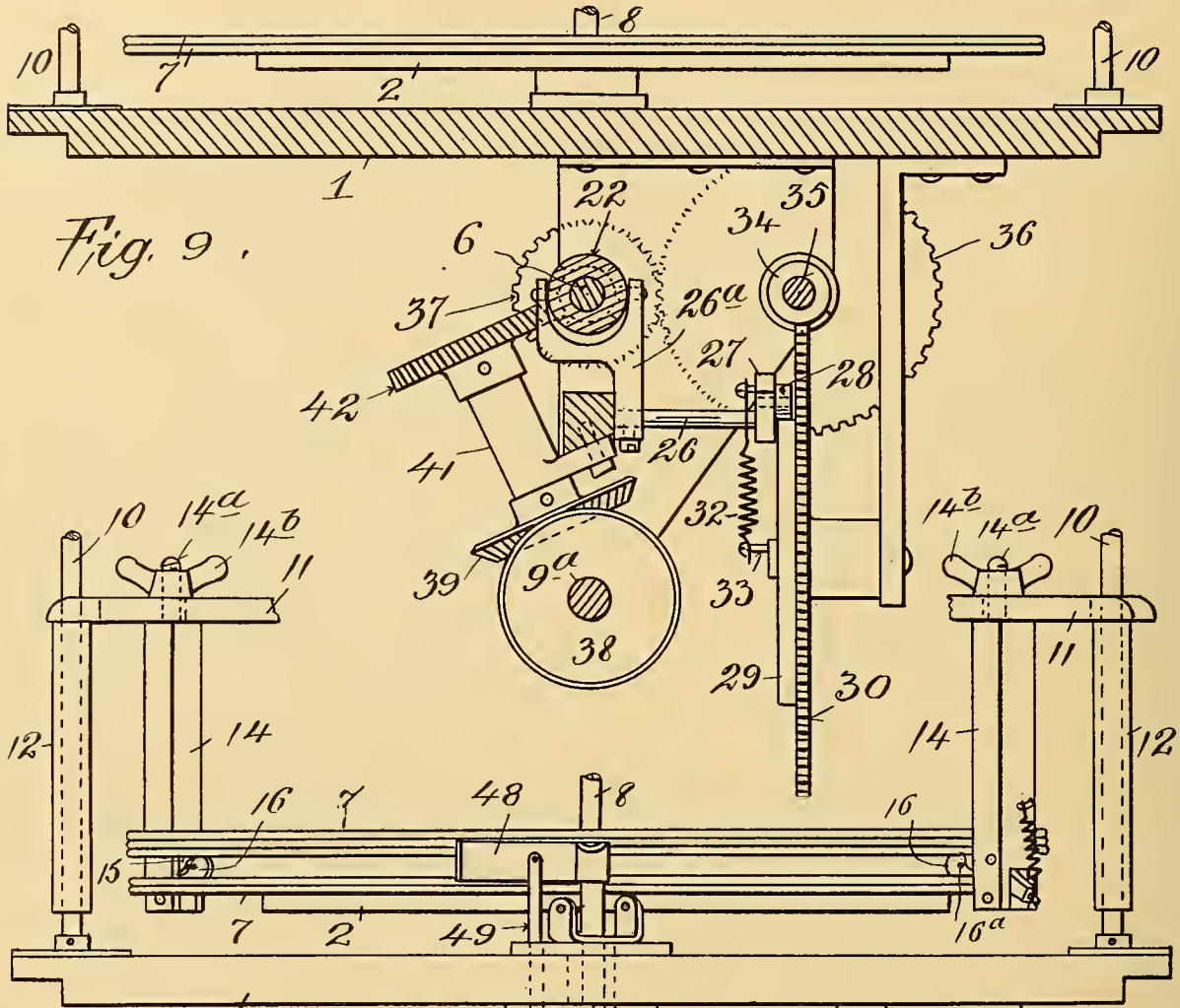
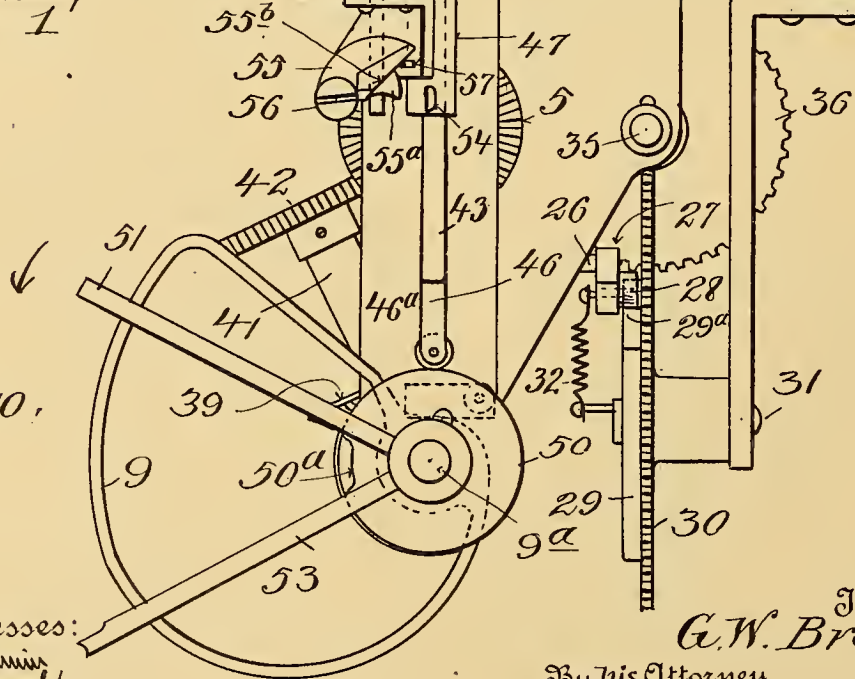


Fig. 10.



Witnesses:  
Benjamin  
Marie F. Wainwright

Inventor  
G. W. Brogan.  
By his Attorney  
D. F. Bourne.

# UNITED STATES PATENT OFFICE.

GRAHAM W. BROGAN, OF MOUNT VERNON, NEW YORK.

## TALKING-MACHINE.

1,099,913.

Specification of Letters Patent.

Patented June 16, 1914.

Application filed October 10, 1912. Serial No. 724,952.

*To all whom it may concern:*

Be it known that I, GRAHAM W. BROGAN, a citizen of the United States, and resident of Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

In sound producing machines, such as those commonly called "talking machines," "graphophones," and the like, it has been customary, so far as I am aware, to manually apply and remove each sound record or disk, for each musical composition, speech, or the like, to be rendered, entailing considerable pauses in the continuity of rendition of the pieces required by the time necessarily consumed in removing and replacing the records.

The object of my invention is to provide means to support one upon another a series of sound-records or disks, and to automatically apply, one after another, the records or disks in position for coöperation with the pin of the sound-box, and to automatically cause the required movement of the sound-box to and from the records or disks after the latter have been successively placed in position for rotation, whereby when a series of superposed records have been placed in the machine, and the driving mechanism is started, the musical compositions, speeches or the like will be rendered from said records one after another, without requiring the machine to be stopped until all of such records have been used.

In carrying out my invention I provide, in a sound producing machine having any suitable means for supporting and rotating sound records or disks and the sound-box to coact therewith, means to support a series or plurality of superposed records or disks, means to lower and raise said records and to separate from the series the lowermost record and deposit it upon the record or records that have been used upon the record rotating devices, and means to cause the sound-box to be raised and moved away from the records that have been used, and to be moved back over and lowered toward the new record that has been deposited for use, whereby the records may be used successively with the sound-box while the machine continues to operate.

My invention also comprises novel details of improvement and combinations of parts

that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein—

Figure 1 is a side elevation of a talking machine embodying my invention; Fig. 2 is an end view of Fig. 1, looking from the righthand side, parts being removed, and showing the parts in the playing position; Fig. 3 is a cross section substantially on the line 3, 3, in Fig. 1; Figs. 4, 5 and 6 are detail views illustrating, in different positions, the dog for separating and depositing one after another the superposed records or disks; Fig. 7 is a side elevation illustrating the parts in the positions assumed when the records are lowered to deposit an unused record in position for use, parts being omitted; Fig. 8 is a plan view of Fig. 7; Fig. 9 is a section substantially on the line 9, 9, in Fig. 7, and Fig. 10 is an end view showing the parts in the position illustrated in Fig. 7, parts being removed; Fig. 11 is an enlarged section on the plane of the line 11, 11, in Fig. 1; Fig. 12 is a similar view on the line 12, 12, in Fig. 1, and Fig. 13 is a detail view of part of the sound-pin operating device.

Similar numerals of reference indicate corresponding parts in the several views.

The numeral 1 in the accompanying drawings indicates a frame, 2 the record or disk-supporting and rotating plate carried by shaft 3 that is journaled in said frame and provided with a gear 4 to mesh with driving gear 5 that is loose on shaft 6 (to be rotatively connected therewith as hereinafter explained) said shaft being journaled in suitable bearings on said frame, and rotated in any suitable manner, all of which parts may be of any wellknown construction in talking machines of the class using record disks. The record disks 7 are adapted to be raised and lowered above plate 2, and to be automatically superimposed upon said plate one after another. At 8 is a rod slidable vertically through hollow shaft 3, and adapted to pass through centrally disposed holes in records 7, which rod rests upon and is adapted to be operated by a cam 9, as hereinafter explained, whereby the records 7 are guided for vertical and rotary movements. Upon frame 1, suitably spaced apart on opposite sides of records 7, are posts 10 upon which a cross bar 11 is guided for up and down movement. Bar 11 is shown provided with guiding tubes or



sleeves 12, slidable upon posts 10, and bar 11 rests upon the upper end of rod 8, whereby as said rod is raised and lowered by cam 9 bar 11 will be correspondingly operated.

5 Bar 11 carries supports 14, suitably spaced substantially diametrically on opposite sides of records 7, said supports being provided adjacent to their lower ends with devices for supporting superimposed records, and de-

10 positing such records, one by one, upon records on plate 2. The devices I have shown for this purpose comprise inwardly extending dogs 15 pivotally carried by supports 14, which dogs pivotally support fingers 16

15 that are adapted to swing downwardly. Dogs 15 at their inner ends are reduced or sharpened at 15<sup>a</sup> in order to conveniently pass between two records 7, and said dogs are normally held by springs 17 against

20 stops 18 on supports 14 (Fig. 5) in which position the dogs 15 support one or more records 7, dogs 15 thereby being adapted to swing upwardly. Fingers 16 are shown pivotally supported in the forked ends 15<sup>b</sup> of

25 dogs 15 (Fig. 6) and are normally pressed upwardly by springs 19 carried by said dogs, stops 16<sup>a</sup> upon fingers 16 normally maintaining said fingers in their upward positions. The relative positions of parts 14, 15 and 16,

30 with respect to the peripheries of records 7, are such that the records may rest upon the dogs for supporting the records at a distance above plate 2, as shown in Fig. 1, and when bar 11 and the records it supports are

35 lowered, said dogs and fingers will act to release the lowermost record to enable it to rest upon plate 2 or the record or records thereon, for successfully supplying new records for use from the series of unused rec-

40 ords, as more fully hereinafter explained.

With the parts in the positions shown in Fig. 1, the uppermost record carried upon plate 2 will be in position to coact with the stylus 21 of sound box or reproducer 20, in

45 the usual manner, and at such time gear 5 will be driven with shaft 6 to rotate plate 2 and the record or records thereon. For this purpose I have shown a clutch having a member 22 slidable upon shaft 6, adapted

50 to be rotated thereby as by a spline and feather, said clutch member 22 on one side being adapted to engage clutch member 23 secured to gear 5, the opposite end of clutch member 22 being adapted, during shifting of

55 the records, to engage clutch member 24 on a worm 25 secured on shaft 6. Clutch member 22, in Fig. 1, is shown in the position for rotating plate 2 and the records it carries, and clutch member 22 is shown provided

60 with a peripheral groove coacting with a shifting fork 26<sup>a</sup> carried by a rock shaft 26, suitably journaled in the frame and having an arm 27 provided with a pin or roller 28 adapted to coact with cam 29 connected with

65 a gear 30 rotatively mounted upon a shaft

or stud 31 carried by the frame. A spring 32 connected with arm 27 and with a pin or other part 33 normally maintains arm 27 depressed with its pin or roller 28 upon cam 29. Cam 29 is shown in Figs. 1 and 7 hav-

70 ing a cut out or reduced part 29<sup>a</sup> for a suitable distance, whereby when pin or roller 28 is upon the high part of the cam, clutch members 22 and 23 will be in engagement for rotating plate 2 and records thereon for

75 rendering the musical composition or the like, but when pin or roller 28 is in the low part 29<sup>a</sup> of the cam, arm 27 will be pulled down by spring 32 to unclutch the members 22, 23, (thereby checking rotation of plate 2

80 and the records) and to engage clutch members 22 and 24.

In the example illustrated gear 30 is rotated by the worm 34 on shaft 35 journaled in the frame, which shaft may be rotated by

85 any well known means used in machines of this class, such as a motor, manually operated crank or the like. Upon shaft 35 is a gear 36, in mesh with a gear 37 secured on shaft 6, whereby as shaft 35 is rotated

90 gear 30, cam 29 and shaft 6 will be simultaneously rotated. When pin or roller 28 is upon the high part of cam 29 and clutch members 22, 23 are in engagement, causing rotation of plate 2 and the records carried

95 thereby for rendition of the composition or piece from the uppermost of such records, cam 9 will be in such position as to retain bar 11 and the records supported thereby in an elevated position, so that the last

100 named records will be above the sound-box 20 when the latter is operating upon the uppermost record on plate 2. When pin or roller 28 drops off the edge 29<sup>b</sup> of the high part of cam 29 into the low part 29<sup>a</sup> of the

105 cam, clutch member 22 will be shifted from member 23 into engagement with member 24, and cam 9 will be operated to cause bar 11 and the records carried thereby to be lowered to cause the lowermost record to be de-

110 posited upon a record on plate 2, and the sound box 20 will be caused to move to one side of the records while the transfer of records is being made, and then to move back over the record or the records upon

115 plate 2. To this end I have shown cam 9 secured upon a shaft 9<sup>a</sup> journaled on the frame and provided with a gear 38 in mesh with a gear 39 carried by a shaft 40 journaled in a bearing 41 carried by the frame,

120 said shaft carrying a gear 42 in mesh with worm 25, whereby when clutch member 22 is caused to engage clutch member 24, plate 2 will cease rotating and shaft 9<sup>a</sup>, through the gearing just described, will be driven

125 from worm 25 to rotate cam 9, whereby rod 8, bar 11, record supports 14, and the records carried by the latter, will be lowered. When roller 28 first drops into the low part 29<sup>a</sup> of cam 29 and worm 25 then begins to ro-

130



tate, sound box 20 will first be raised from the underlying record, and then swung from the operating position, shown in Fig. 1 and in dotted lines in Fig. 8, to one side of the records, as shown in full lines in Figs. 7 and 8, and be retained in such position while the low part of cam 29 is riding under roller 28, during which time bar 11 and records carried thereby will be lowered, a record deposited, and bar 11 and any remaining records carried thereby will be again raised, and while bar 11 is rising and just before roller 28 rides up on the high part of cam 29 sound box 20 will be moved back over the records on plate 2 and its stylus 21 will be lowered upon the outer portion of the uppermost record, whereupon clutch member 22 will be released from clutch member 24 and reengaged with clutch member 23, to again cause plate 2 to rotate for rendering from the record, in the usual manner. To this end I have shown sound box 20 pivotally supported to rock vertically and swing laterally, for which purpose in the example illustrated, the horn 20<sup>a</sup> carrying the sound box is pivotally carried on a vertically disposed rock shaft 43 suitably journaled on frame 1. Shaft 43 at its upper end is shown provided with a yoke 43<sup>a</sup> carrying a pin or shaft 44 upon which is pivotally mounted a bracket or arm 45 secured to horn 20<sup>a</sup>. Below horn 20<sup>a</sup> is a vertically movable rod 46 slidable in a suitable guide 47 carried by frame 1, said rod being shown provided at its upper end with a head piece 48 to bear under horn 20<sup>a</sup>, said head piece being shown provided with a guide rod 49 depending through a guiding opening in frame 1 to keep said head from rotating while permitting its up and down movements. Rod 46 rests upon and is actuated by a cam 50, secured upon shaft 9<sup>a</sup>, rod 46 being shown provided with a roller 46<sup>a</sup> to work on said cam. When a piece is being rendered rod 46 will rest in the recess or low part 50<sup>a</sup> of cam 50 so that the sound box will be lowered to enable its stylus 21 to rest upon the uppermost record on plate 2, but when shaft 9<sup>a</sup> first rotates and the high part of cam 50 raises rod 46, horn 28 will be tilted to raise stylus 21 from the record. Head piece 48 is of sufficient length to enable horn 20 to rest thereon, while the latter is being shifted or swung, to carry the sound box away from over the records on plate 2 and back thereover (see Fig. 8).

Just after the sound-box has been raised from the topmost record upon plate 2 a finger 51 carried by shaft 9<sup>a</sup> will engage a pin 52 projecting from rod 43 (Fig. 1), and will rotate said rod and thereby swing horn 20<sup>a</sup> and sound box 20 away from the records, as shown in Fig. 8, to enable a record or records carried by record supports 14 to be lowered and deposited over plate 2,

and bar 11 and its remaining records to be raised, by the now continued rotation of cam 9, because at such time shaft 9<sup>a</sup> will be rotated by worm 25 and the connected gearing. When bar 11 has nearly reached the limit of its upward stroke, and before the high part of cam 29 shifts clutch member 22 back to clutch member 23, an arm or finger 53 secured on shaft 9<sup>a</sup> will engage the projection or pin 54 (Fig. 2), connected with rod 43 on the side opposite pin 52 and rotate said rod to return the sound box over the records on plate 2. Said projection 54 first encounters a lug or ear 55<sup>a</sup> on a latch 55 pivotally supported at 56 on the main frame, which latch normally rests upon a pin 57, (Fig. 10). Said lug or ear 55<sup>a</sup> stops the sound box and its stylus 21 adjacent to the outer periphery of the uppermost record on plate 2, just before rod 46 drops into the low part 50<sup>a</sup> of cam 50. Slight further rotation of shaft 9<sup>a</sup> carries finger 53 away from projection 54 and into engagement with the inclined under edge 55<sup>b</sup> of latch 55 raising its lug 55<sup>a</sup> out of the path of projection 54 (Fig. 2), and rod 46 will drop into recess 50<sup>a</sup> of cam 50, causing stylus 21 to rest upon the last named record, and thereupon the high part of cam 29 will operate clutch member 22 to shift it from clutch member 24 to clutch member 23, the sound box and horn now being free to move inwardly of the records on plate 2 during the rotation of said records which now takes place. The sound record shifting devices will now remain in substantially the positions shown in Fig. 2 with arm or finger 53 retaining latch 55 elevated. When arm or finger 53 next moves away from latch 55, the latter will drop and rest upon stop 57, then retaining lug 55<sup>a</sup> in the path of projection 54, (Fig. 10).

In the arrangement illustrated the supports 14 are set to receive records of a certain size, say ten inches in diameter, but if it is desired to use larger records, such as twelve inches in diameter, means are provided to enable the record-supports 14 to be adjusted radially of the records along bar 11. To this end I have shown bar 11 provided with slots 11<sup>a</sup> (Fig. 8) receiving screws or threaded studs 14<sup>a</sup> extending from supports 14, and provided with nuts 14<sup>b</sup>, whereby supports 14 may be adjusted along slots 11<sup>a</sup> and then secured to bar 11, to accommodate disks of different diameters as desired.

As it is desirable to frequently replace the styli 21 for coaction with the records, and as with my improvements a series of records may be used one after another without stopping the machine, I have provided means for automatically shifting styli 21 as the records are automatically changed. To this end I have shown a support 60, shown in the form of a bent wire, having one end re-



ceived in the socket of sound box 20 where the usual sound stylus is placed and secured by screw 61 (Figs. 11 and 12), and to the outer end of said support 60 is secured a stud 62 upon which a stylus carrying disk 63 is rotatively mounted. For convenience in readily replacing styli 21 upon disk 63 the latter is shown made in two separable parts 63<sup>a</sup>, 63<sup>b</sup>, having recesses 63<sup>c</sup> to receive the inner ends of styli 21, and nut 62<sup>a</sup> on screw 62 serves to clamp the members of disk 63 upon styli 21. To disk 63 is secured a ratchet wheel 64 adapted to be engaged by a dog or projection 65<sup>a</sup> on a rod 65, shown pivotally supported upon a rock arm 66, that is pivotally carried, at 67, upon a bracket or the like 68, shown secured upon the side of horn 20<sup>a</sup>. Spring 69 (Fig. 1) connected with rod 65 and with a suitable support, as with the part 67 tends normally to retain rod 65 retracted. Rod 65 is shown supported to move in a guide 70 on horn 20<sup>a</sup>. The lower bent end 66<sup>a</sup> of rocker 66 is adapted to pass under an abutment 71, shown in the form of a bent finger, secured upon frame 1 (Fig. 11) and projecting transversely thereof, the end 66<sup>a</sup> of arm 66 being normally free below the level of abutment 71. The arrangement is such that when said pin operating parts are in the normal position, as shown in Fig. 1, one of the styli 21 will be in position to coact with the uppermost disk upon plate 2, end 66<sup>a</sup> of rocker arm 66 will be lower than abutment 71, and dog 65<sup>a</sup> will be substantially in the position shown in Fig. 13. When the sound-box and horn have been moved inwardly, and cam 50 causes rod 46 to rise to raise the sound box upwardly, the projection 66<sup>a</sup> will encounter abutment 71 and cause arm 66 to be rocked to push rod 65 to the left in Fig. 1, thereby causing dog 65<sup>a</sup> to rotate the ratchet 64 one step thereby rotating disk 63 and its stylus 21 to present a new stylus in position to act on a record; when the sound box is moved outwardly away from the records the end 66<sup>a</sup> of arm 66 will be released from abutment 71, spring 69 will restore said arm, rod 65 and dog 65<sup>a</sup> to the normal positions (Fig. 13) ready to again rotate disk 63 upon the next rise of sound box 20. By the means described each time a record has been used and the sound box 20 has been raised, the disk 63 will be automatically rotated to present a new stylus for use, and such styli may be replaced as often as desired, whereby during the rendering of a series of records placed in the machine a different stylus may be automatically set for use for each record. The complete operation may be described as follows: Assume that a record is upon plate 2, and that a desired number or series of records are supported by fingers 15 of record-supports 14, by having removed bar 11, placed the records upon fingers 15, and

replaced bar 11 on posts 10 and rod 8, that roller 28 is upon the high part of cam 29 at its edge 29<sup>c</sup>, clutch members 22, 23 thus being in engagement; that sound box 20 is in position over the outer portion of the lower records, with stylus 21 in position to commence action on the uppermost record on plate 2, and that latch 55 is held up by arm 53 as in Fig. 2. The rotation of shaft 35 will thereupon, through worm 34 and gear 30, rotate cam 29 in the direction of the arrow in Fig. 1, and said shaft, through the appropriate gearing will rotate plate 2 and the record or records thereon in the direction of the arrow in Fig. 8, whereupon stylus 21, coacting with the uppermost record on plate 2 in the usual manner, will cause the sound box to feed inwardly, turning rod 43 with it, and thus moving pins 52 and 54 to the right (Fig. 8). When plate 2 and its record are rotated sufficiently to complete rendition of the piece and the sound box has been moved completely inwardly, with the end 66<sup>a</sup> of arm 66 carried under abutment 71, and cam 29 has been rotated so that pin or roller 28 drops off edge 29<sup>b</sup> of said cam into the low part 29<sup>a</sup> thereof, clutch member 22 will be shifted into engagement with clutch member 24 (the record-driving gearing being then unclutched at 22, 23, causing plate 2 and its records to cease rotation), and thereupon worm 25, through the appropriate gearing, will rotate shaft 9<sup>a</sup>, cam 29 still continuing to rotate. When shaft 9<sup>a</sup> now begins to rotate, arm or finger 53 will pass away from latch 55 allowing the latter to drop and move its lug 55<sup>a</sup> in front of projection 54; cam 50 will rotate to raise rod 46 and thereby cause stylus 21 to be lifted from the sound record, arm 66 will be rocked by engagement with abutment 71, causing dog 65<sup>a</sup> to rotate ratchet 64 and disk 63 one step presenting a new stylus 21 over the records in position for use, and thereupon arm or finger 51 (moving in the direction of the arrow in Fig. 10) will engage pin 52 and rotate shaft 43, causing the sound box to swing outwardly from the dotted position shown in Fig. 8 free from the record or records on plate 2, to substantially the full line position shown in said figure, and arm 66 and rod 65 will return to their normal positions. Thereupon cam 9 will have been rotated sufficiently far to allow rod 8 to descend, whereupon bar 11 with the records it carries will be lowered substantially to the position shown in Figs. 7 and 10, with fingers 16 resting upon the uppermost record on plate 2. A continued descent of bar 11 and its records, with fingers 16 resting upon the last named record, causes dog 15 to tilt, so that their inner ends 15<sup>a</sup> slide upwardly past the edge of the lowermost record 7<sup>a</sup>, and when rod 8 rests in the low part of cam 9, (Fig. 10) the ends 15<sup>a</sup> of said dogs will



be in position to pass between the edges of record 7<sup>a</sup> and the record next thereabove, so that when cam 9 next begins to raise rod 8 the springs 17 will cause the ends 15<sup>a</sup> of dogs 15 to enter between said records, while fingers 16 still remain between record 7<sup>a</sup> and the record next below the same, as shown in Fig. 4. A continued upward movement of rod 8, raising bar 11, supports 14, and records 7, enables the ends 15<sup>a</sup> of dogs 15 to pass between record 7<sup>a</sup> and the record thereabove, by the action of springs 17 tilting dogs 15 back to their normal positions, (Fig. 5), thereby causing said dogs to support the records above them, and the continued rise of supports 14 and records supported by dogs 15 will then occur; thereupon fingers 16 will move upwardly away from the uppermost record on plate 2, and the weight of record 7<sup>a</sup> now coming upon fingers 16, will cause them to tilt outwardly and deposit the record 7<sup>a</sup> upon the uppermost record upon plate 7, as shown in dotted lines in Fig. 5. When supports 14 and dogs 15 have been raised by cam 9 sufficiently, the fingers 16 will be released from the thus deposited record 7<sup>a</sup>, and the springs 19 will restore said fingers to their normal positions. Continued rotation of shaft 9<sup>a</sup>, causing further rotation of cams 9 and 50 and arms or fingers 51 and 53, occurs while pin or roll 28 is in the low part of cam 29, whereupon cam 9 raises rod 8, bar 11, supports 14, and the records remaining on dogs 15, and just before pin or roll 28 rides up on the edge 29<sup>c</sup> of cam 29 arm or finger 53 will push pin 54, causing shaft 43 to rotate the sound-box back over the outer portion of the records on plate 2, until stylus 54 engages lug 55<sup>a</sup>, whereupon pin 21 will be in position to start action on the record. At such time cam 9 will have raised bar 11 and its records to the uppermost or normal positions, arm or finger 53 will pass away from projection 54, rod 46 will descend to the low part 50<sup>a</sup> of cam 50, and arm or finger 53 will engage and raise latch 55 to carry its lug 55<sup>a</sup> away from projection 54, and thereupon clutch members 22 and 24 will be disengaged by pin or roll 28 now riding up on the high part 29<sup>c</sup> of cam 29, the sound box operating devices will come to rest, clutch members 22 and 23 will reengage, and plate 2 and the records thereon will begin to rotate, and the operations described will be repeated. It will thus be understood that when a desired number of records have been placed upon the fingers 15 in an elevated position with, say, one record upon plate 2, that the machine may be started and continuously operated until all of the records have been deposited one after another, and the pieces rendered successively therefrom, without stopping the machine and without requiring manipulation of the parts by the user,

other than the replacement of styli 21 if that becomes necessary.

Having now described my invention what I claim is:

1. A talking machine comprising means for rotating records, means for supporting a series of records, and means for lowering said series of records toward said rotating means comprising means for depositing a record from such series upon said rotating means and raising the remaining records of said series therefrom. 70 75

2. A talking machine comprising means for rotating records, means for supporting a series of records, means for lowering said series of records toward said rotating means comprising means for depositing a record from such series upon said rotating means and raising the remaining records of said series therefrom, sound reproducing devices to coact with the records, and means to automatically place the sound reproducing devices between the record on the rotating means and said series of records and for removing the sound reproducing devices therefrom. 80 85 90

3. A talking machine comprising means for rotating records, means for supporting a series of records adjacent their edges above said rotating means, and means for lowering said records and depositing upon the rotating means the lowermost record of said series while retaining the remainder of said series of records upon their supporting means and raising them from said rotating means. 95 100

4. A talking machine comprising means for rotating records, means for supporting a series of records adjacent their edges above said rotating means, means for lowering said records and depositing upon the rotating means the lowermost record of said series while retaining the remainder of said series of records upon their supporting means and raising them from said rotating means, sound reproducing devices, and means for automatically placing said sound reproducing devices between a record on said rotating means and the series of records thereabove. 105 110 115

5. A talking machine comprising means to rotate records, record supports above said rotating means, and means to lower and raise said supports, said supports comprising means to release a record and deposit it upon said rotating means and to retain other records upon said supports. 120

6. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising means to release a record and deposit it upon said rotating means and to retain other records upon said supports, sound reproducing devices, and means to automati- 125 130



cally place said sound reproducing devices between said rotating means and the records carried by said supports.

7. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising dogs to support records, and means to cause the dogs to pass between a lowermost record and a record thereabove to retain the latter.

8. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising dogs, said dogs having fingers adapted to cause the dogs to release the lowermost record, and means to cause the dogs to enter between said lowermost record and the record thereabove.

9. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising dogs, said dogs having movable fingers to cause said dogs to release the lowermost record, and means to cause said dogs to enter between said lowermost record and a record thereabove.

10. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising dogs, said dogs having pivotal fingers adapted to swing downwardly, means to normally hold said fingers in set positions upon the dogs, said fingers serving to cause the dogs to pass above the lowermost record of the series, said fingers being adapted to move away from said lowermost record to release it, and means to cause the dogs to enter between said lowermost record and a record thereabove.

11. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising dogs, said dogs being pivotally carried by said supports, stops upon the supports for said dogs, springs to actuate said dogs, and means to cause said dogs to release a lowermost record and to support the records thereabove.

12. A talking machine comprising means to rotate records, record supports above said rotating means, means to lower and raise said supports, said supports comprising dogs, said dogs being pivotally carried by said supports, stops upon the supports for said dogs, said dogs having pivotal fingers adapted to tilt said dogs to cause them to release a lowermost record, and means to cause said dogs to enter between two records.

13. A talking machine comprising means

to rotate records, sound reproducing means to coact with said records, a shaft movably carrying said sound reproducing means, said shaft being provided with projections, means to raise and lower said sound reproducing means, and means to operate said projections successively to move the sound reproducing means away from a record and return it over a record.

14. A talking machine comprising means to rotate records, sound reproducing means to coact with said records, a shaft movably carrying said sound reproducing means, said shaft being provided with projections, a rod having a head to support said sound reproducing means, a cam to operate said rod to raise and lower said sound reproducing means, a shaft carrying said cam, and projections operative with said shaft to actuate said first named projections to move the sound reproducing means away from the record and return the same over a record.

15. A talking machine comprising means to rotate records, sound reproducing means to coact with said records, a shaft movably carrying said sound reproducing means, said shaft being provided with projections, a rod having a head to support said sound reproducing means, a cam to operate said rod to raise and lower said sound reproducing means, a shaft carrying said cam, fingers operative with said shaft to actuate said first named projections to move the sound reproducing means away from the record and return the same over a record, a latch to coact with one of said first named projections, one of said fingers being adapted to raise the latch to permit movement of said last named projection, and means to retain the latch in position to engage said last named projection when the latter is not held by said finger.

16. A talking machine comprising means to rotate records, a sound box, means to movably support the sound box, a plurality of styli to coact with a record, means to rotatively support said styli, an arm, a dog connected with the arm, a ratchet connected with said styli, and an abutment to coact with said arm to cause rotation of said styli upon movement of said arm.

17. A talking machine comprising means to rotate records, a sound box, means to movably support the sound box, a plurality of styli to coact with a record, a rotative disk carrying said styli, a ratchet connected with said disk, a dog to operate said ratchet, an arm supported to move with said sound box and connected with said dog, and an abutment to actuate said arm upon appropriate movement of the sound box.

18. A talking machine comprising means to rotate a record, a sound box, a support carried by the sound box, a disk rotatively carried by said support, styli detachably

carried by said disk, an arm connected with the sound box, means operated by the arm to rotate said disk, and means to operate said arm upon appropriate movement of the  
5 sound box.

19. A talking machine comprising means to rotate a record, a sound box, a support carried by the sound box, a disk rotatively carried by said support, styli detachably car-  
10 ried by said disk, a ratchet connected with said disk, an arm connected with the sound

box, a dog connected with the arm to operate the disk, and an abutment to coact with the arm to cause rotation of said disk upon appropriate movement of the sound box. 15

Signed at New York city, in the county of New York, and State of New York, this 1st day of October, A. D. 1912.

GRAHAM W. BROGAN.

Witnesses:

T. F. BOURNE,

MARIE F. WAINRIGHT.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



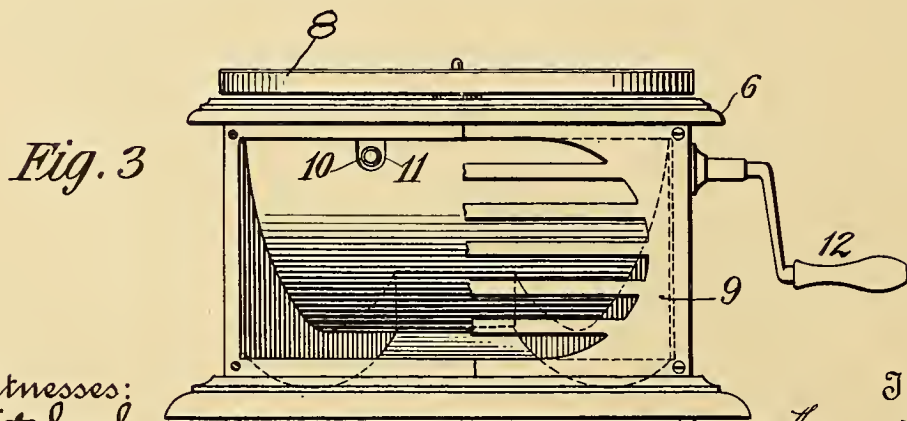
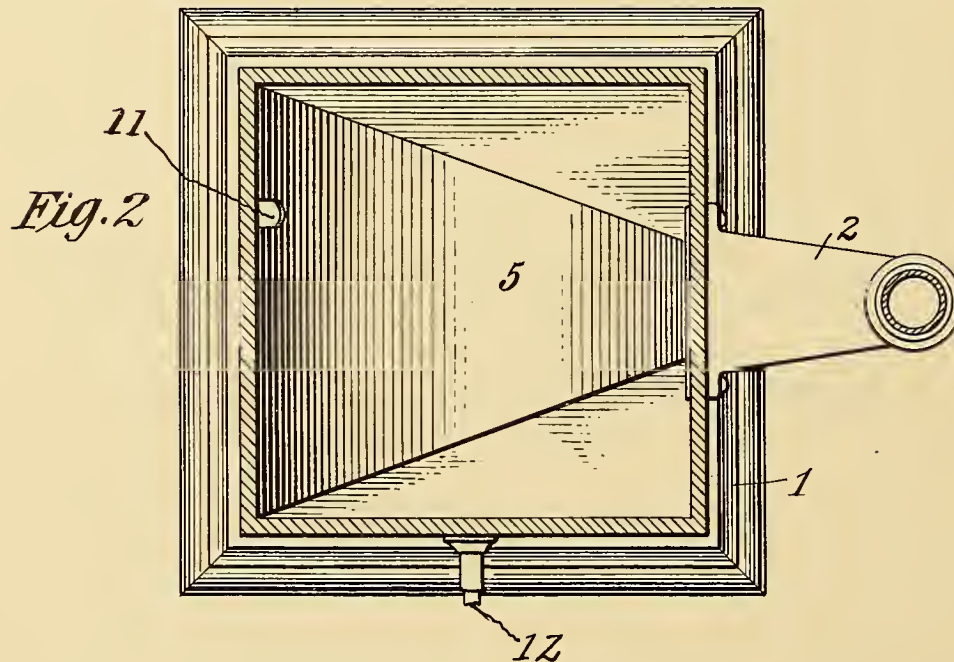
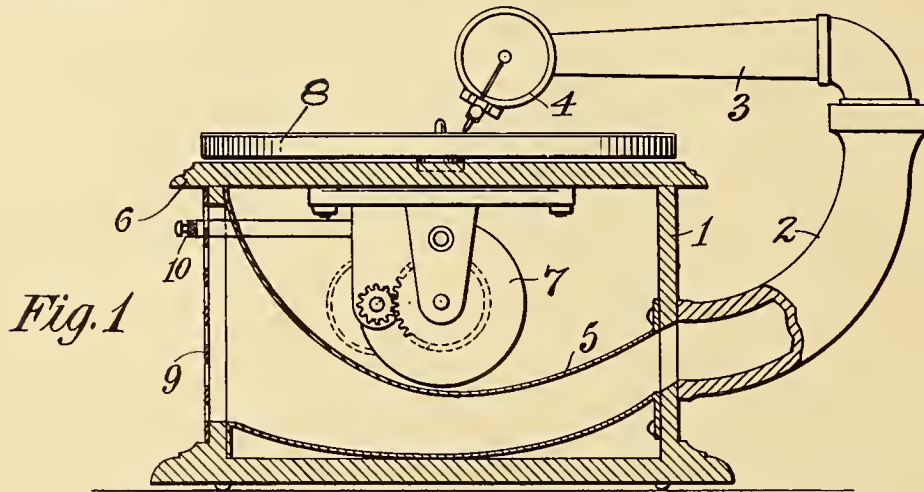




T. H. MACDONALD.  
TALKING MACHINE.  
APPLICATION FILED SEPT. 7, 1911.

1,099,928.

Patented June 16, 1914.



Witnesses:  
R. C. Fitzhugh.  
C. E. Warfield

Inventor  
Thomas H. Macdonald,  
By his Attorneys  
Mawro, Cameron, Lewis & Macdonald



# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## TALKING-MACHINE.

1,099,928.

Specification of Letters Patent.

Patented June 16, 1914.

Application filed September 7, 1911. Serial No. 648,091.

*To all whom it may concern:*

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States, and a resident of Bridgeport, Connecticut, (whose post-office address is care of American Graphophone Company, Bridgeport, Connecticut,) have invented a new and useful Improvement in Talking-Machines, which improvement is fully set forth in the following specification.

The object of my invention is to produce a so-called "hornless" talking machine, or machine with inclosed horn.

More particularly, the invention consists of the compact and efficient arrangement of the various parts without sacrificing the efficiency of the machine or the quality of its reproduction of sounds.

The invention consists of the construction and arrangement of parts and of certain details hereinbelow more fully set forth and claimed.

My invention will be best understood by referring to the annexed drawings, which illustrate a preferred embodiment thereof.

In the drawings, Figure 1 is a vertical section taken longitudinally through the middle of the sound-conveyer or "horn". Fig. 2 is a plan view of the machine, with the motor and the cover or lid of the cabinet removed; and Fig. 3 is a front elevation partly broken away.

1 represents the cabinet or box, usually of wood, comparatively shallow, and of the general shape and appearance indicated.

2 is a curved, hollow metal casting, which serves both as a bracket to support the movable tone-arm and also as a sound-conveyer. This bracket is secured firmly at its lower end to the lower part of the rear wall of the cabinet 1, which is apertured to register with the interior of the bracket; while the upper end of the latter is provided with a horizontal bearing in which the tone-arm is journaled.

3 is the tone-arm, preferably tapering as shown; it is provided at its rear with the down-turned elbow, which is journaled in the bearing aforesaid, while the outer end of the tone-arm carries the sound-box 4 in any well-known manner.

5 is the continuation of the sound-conveyer, located within the cabinet 1, and hereinafter referred to as the "horn". Preferably, this horn consists of four walls, (of

tin, thin veneered wood, or the like); the side walls flaring widely as indicated in Fig. 2, while the upper and lower walls are shaped as indicated in Fig. 1. The mouth of the horn expands to occupy the greater part of the front wall of cabinet 1, which is cut away to register therewith; while the central portion of the horn is down-curved, or depressed, into a sort of flattened U, to provide clearance for the motor.

6 is the lid or cover of the cabinet, which may be secured by screws or in any other convenient manner. The motor 7 is secured to the lower side of cover 6, and depends into the interior of the cabinet, horn 5 being curved downward to leave room for the motor; and the upper wall of the horn serves (with cover 6) to constitute a motor-compartment. From the motor arises the upright shaft which carries the usual turntable 8 located above lid 6. Preferably, the opening in the front wall of the casing, at the outlet of the horn, will be covered by a grating, as 9.

At 10 is indicated the outer end of the usual motor-controls (the start-and-stop device and the speed-regulator), the upper wall of the horn being cut away for the purpose, as indicated at 11. The winding-crank 12 is inserted through a hole in one of the side-walls of the cabinet.

Among the novel features of the machine constructed in accordance with this invention, are the following: The sound-conveyer (consisting of tone-arm 3, hollow bracket 2 and horn 5) is a continuous, unobstructed, and gradually-enlarged, or flaring passage; the mouth of the horn, where the sounds are emitted, occupies substantially the entire front wall of the cabinet, so that the music is widely and effectively emitted; yet, notwithstanding this enlarged mouth of the horn, the downward curving of its middle portion leaves room for the motor, without requiring a deeper cabinet or casing, and without interfering with the free passage of sound,—the lateral widening of this portion 5, compensating for its downward curving; the upper wall of the horn assists in providing a compartment to incase the motor; the hollow bracket 2 is supported entirely at its lower end, so that it is readily assembled into place; provision is made for the start-and-stop mechanism and for the speed-regulator, by cutting a hole in the up-

per wall of the horn; and the entire machine is very simple to assemble and is extremely compact, and without any sacrifice of the mechanical parts of a practical talking-machine, and without any loss in the quality of the sound-reproductions.

I have thus described my invention with some particularity, but only for the sake of clearness, since I do not limit myself to the precise construction and arrangement disclosed; and modifications of construction and of arrangement may be resorted to without departing from the spirit of my invention.

Having thus described my invention, I claim:

1. In a talking machine, the combination of a substantially rectangular cabinet having a large aperture extending over practically the entire front wall thereof and a small aperture adjacent the bottom of the opposite wall, a motor depending from the top of said cabinet, a substantially flattened U-shaped sound conveyer connecting said apertures and having its upper wall curved downwardly to provide a space for said motor, the end of said wall adjacent said large aperture extending to the height of said motor, the mouth of said conveyer being expanded to substantially the dimensions of the front wall of said cabinet and surrounding said aperture, a hollow bracket registering with the smaller aperture, a tone-arm journaled upon said bracket and carrying a sound box, and motor controlling devices extending through said large aperture and the upper wall of said sound conveyer.

tering with the smaller aperture, and a tone-arm journaled upon said bracket and carrying a sound box.

2. In a talking machine, the combination of a substantially rectangular cabinet having a large aperture extending over practically the entire front wall thereof and a small aperture adjacent the bottom of the opposite wall, a motor depending from the top of said cabinet, a substantially flattened U-shaped sound conveyer connecting said apertures and having its upper wall curved downwardly to provide a space for said motor, the end of said wall adjacent said large aperture extending to the height of said motor, the mouth of said conveyer being expanded to substantially the dimensions of the front wall of said cabinet and surrounding said aperture, a hollow bracket registering with the smaller aperture, a tone-arm journaled upon said bracket and carrying a sound box, and motor controlling devices extending through said large aperture and the upper wall of said sound conveyer.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

SOPHIE B. MACDONALD,  
MARGARET MURRAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

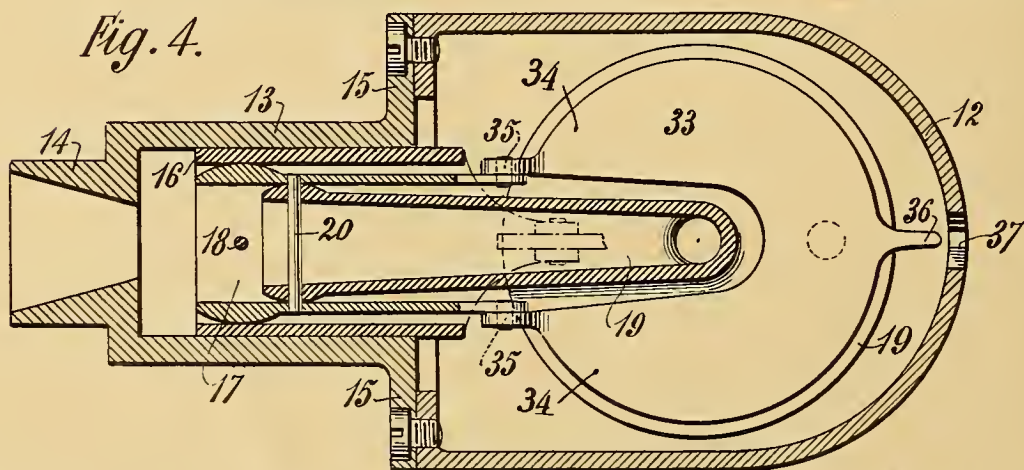
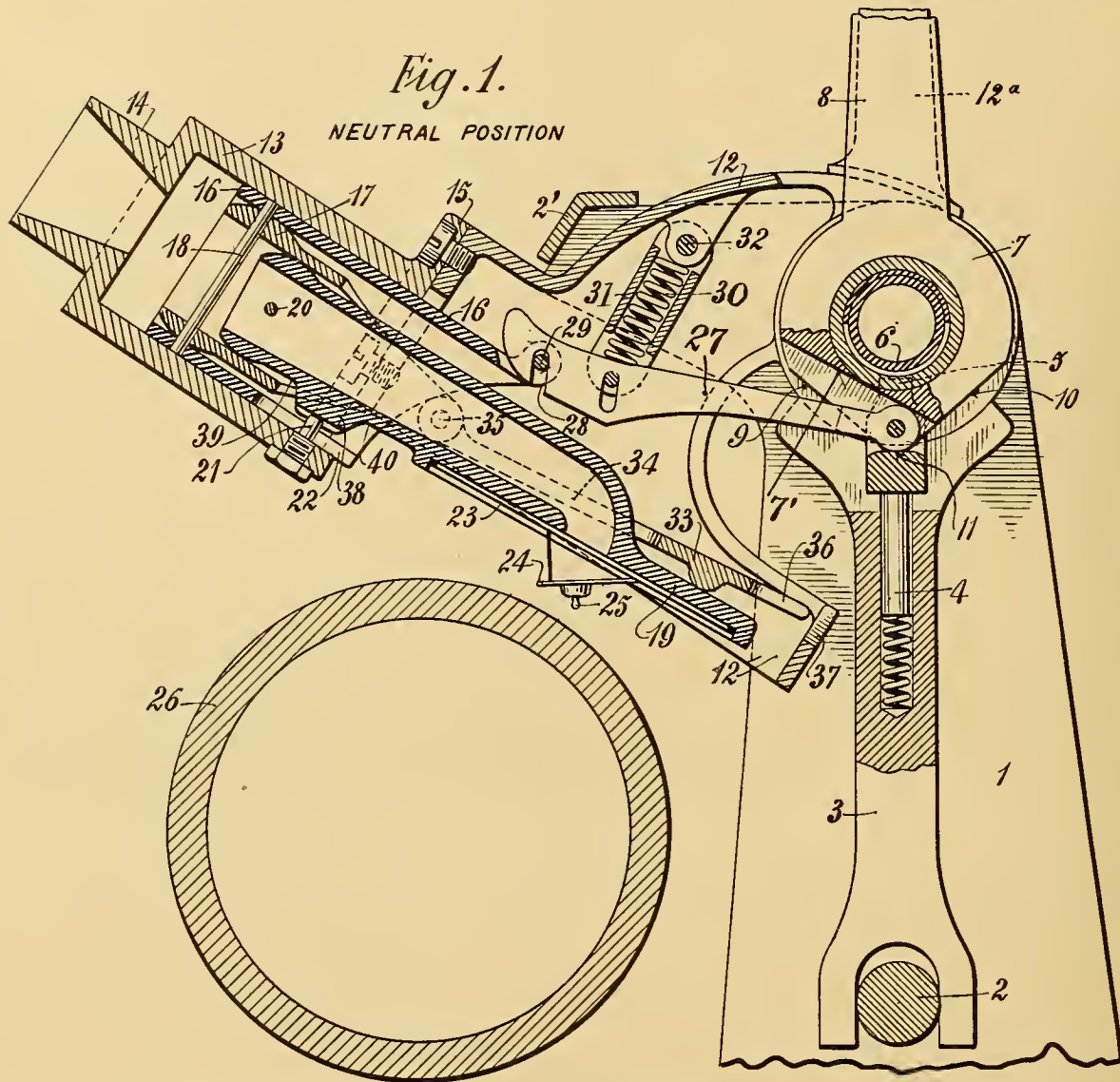




1,100,024.

Patented June 16, 1914.

3 SHEETS—SHEET 1.



Witnesses:  
 Gustave R. Thompson  
 Ruth C. Fitzhugh

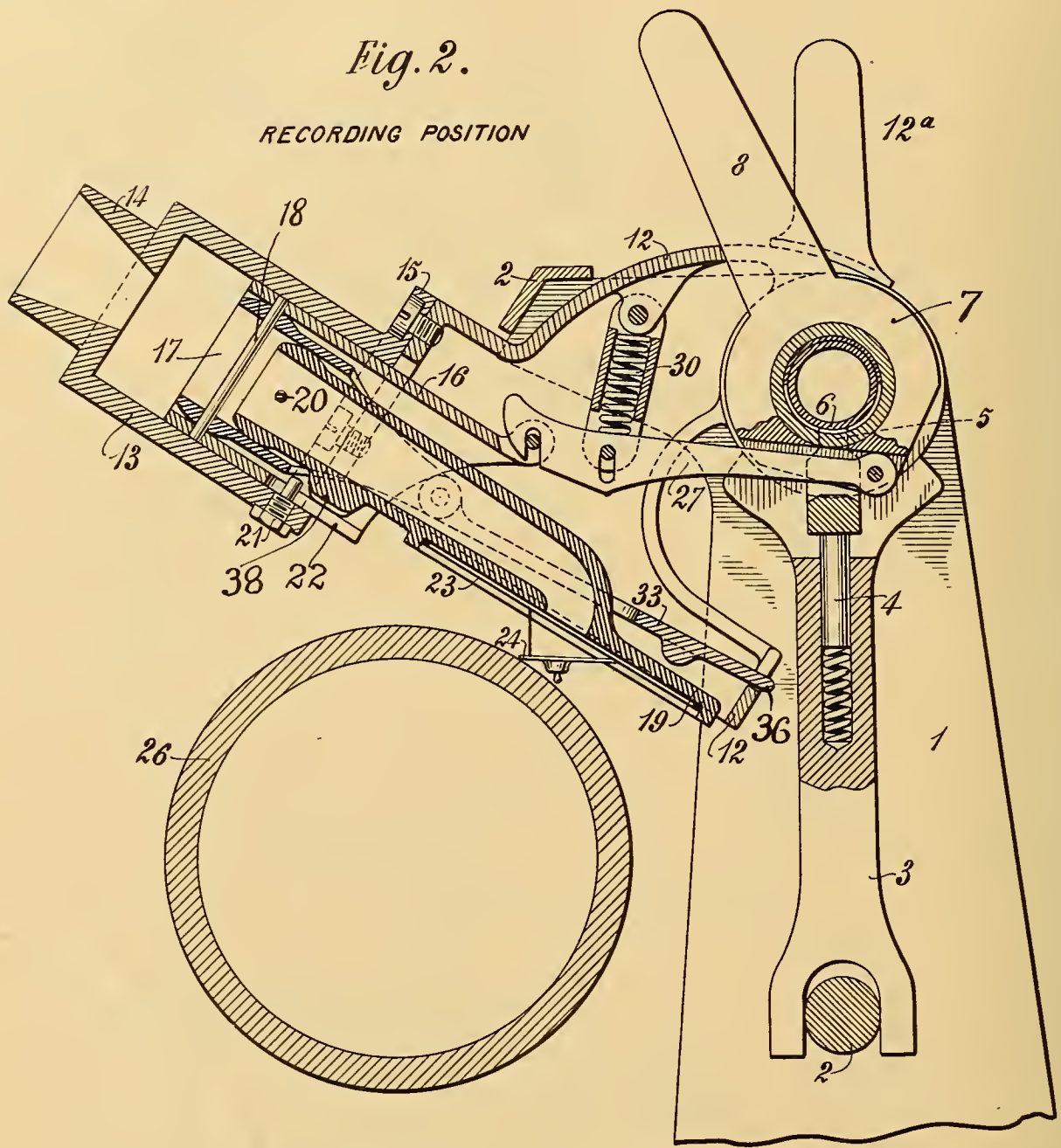
Inventor  
 Thos. H. Macdonald  
 By his Attorneys  
 Mauro Cameron Lewis & Macdonald



1,100,024.

*Fig. 2.*

RECORDING POSITION



Witnesses:  
 Gustave R. Thompson  
 Rich C. Fitzhugh

Inventor  
 T. H. Macdonald  
 By his Attorney  
 Henry Cameron Lewis Massie





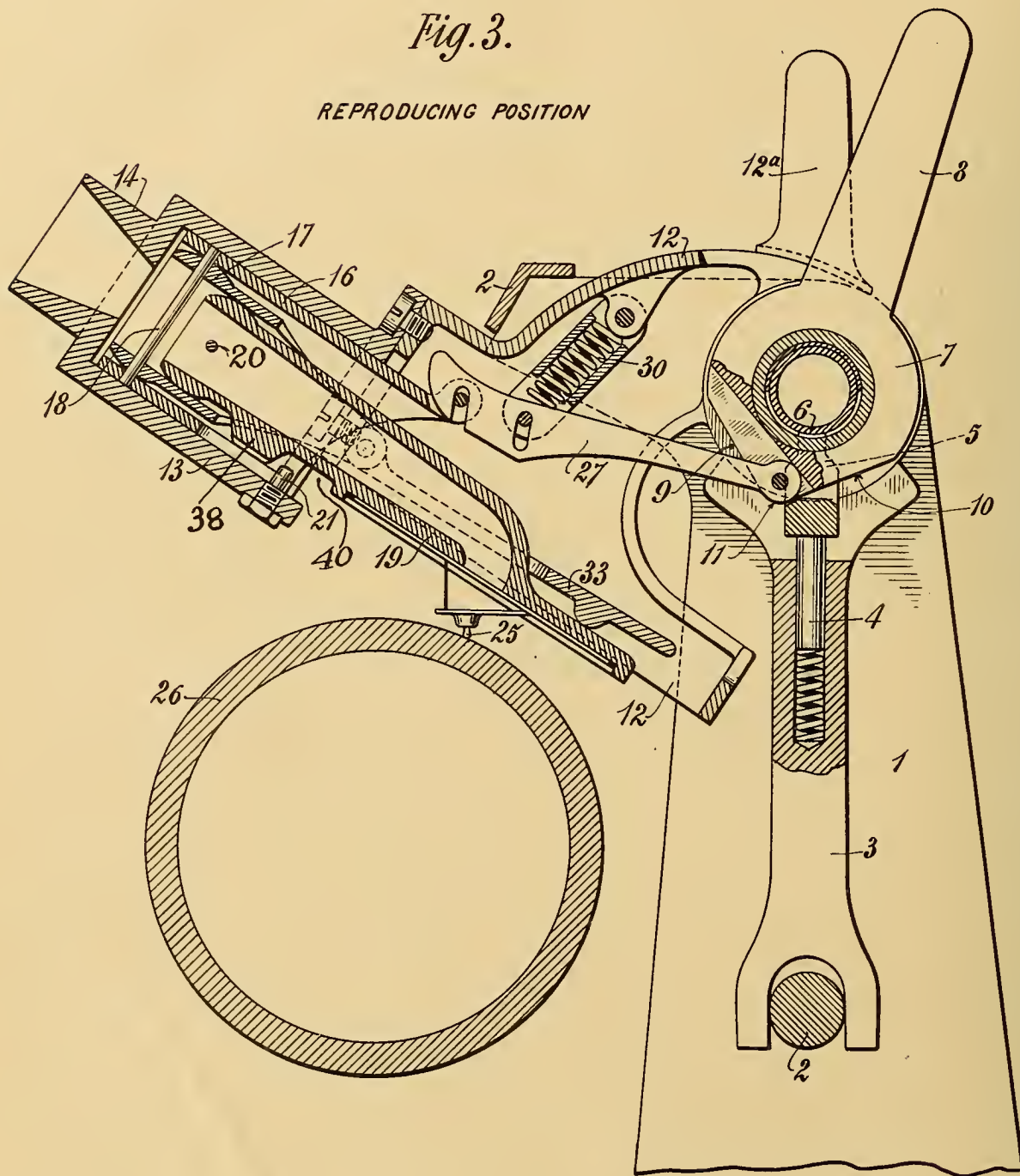
1,100,024.

Patented June 16, 1914.

3 SHEETS—SHEET 3.

*Fig. 3.*

REPRODUCING POSITION



Witnesses  
 Gustave R. Thompson  
 Ruth C. Fitzhugh.

Inventor  
 T. H. MacDonald  
 By his Attorneys  
 Mauro Cameron Lewis & Musie

# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## DICTATION-GRAPHOPHONE.

1,100,024.

Specification of Letters Patent.

Patented June 16, 1914.

Application filed August 29, 1908. Serial No. 450,811.

*To all whom it may concern:*

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Dictation-Graphophone, which is fully set forth in the following specification.

This invention relates to talking-machines employed for dictation purposes, where both a recorder and a reproducer are required, and where it is also desirable at times to throw the parts out of gear while the motor is still running. It has been proposed to locate the recording-stylus and the reproducing-stylus upon a diaphragm common to both, and then by shifting the position of the diaphragm bring either of the two styluses into play. But entirely satisfactory results are not obtained in such constructions for two reasons: In the first place, other things being equal, and within reasonable limits, the lighter the recording-device the more sensitive it is, and the better it will record; whereas a reproducing-device acts better the heavier it is. In the second place, a recorder should have the vertical play necessary to adjust itself to any unintentional eccentricity of the blank-cylinder, but should not have any lateral play; whereas the reproducer should have not only the vertical play, but also sufficient lateral play to enable it to track the helical record-groove of the sound-record. It has also been proposed to have two "speakers" interchangeable upon the machine, one a recorder and the other a reproducer, in order to provide the two differing qualities just mentioned.

It is the object of the present invention to provide in a single construction a "speaker" that is capable of ready adjustment into each one of three positions (1) where it becomes a comparatively light recorder having vertical play but no lateral play; (2) where it becomes a comparatively heavy reproducer having both lateral and also vertical play; and (3) where it is neutral.

The invention consists, then, of the speaker carrying the recording-stylus and the reproducing-stylus upon a common diaphragm, in combination with the ordinary "start-and-stop" mechanism and suitable attachments and connecting-devices by which the adjustments above referred to may be accomplished.

The invention consists further in the de-

tails and arrangements hereinafter pointed out and claimed.

My invention will be best understood by reference to the annexed drawings, in which—

Figure 1 is a vertical section through the parts upon an ordinary graphophone or other talking-machine, showing the "speaker" in its inoperative or "neutral" position; Fig. 2 is a similar view, showing the device adjusted to become a "recorder"; Fig. 3 is a similar view, showing the device adjusted to become a "reproducer"; and Fig. 4 is a substantially horizontal section taken through the speaker and its connecting parts.

1 indicates one of the two vertical end-standards at the rear of an ordinary graphophone. 2 is the horizontal guide-rod connecting the lower portions of these standards; and 2' indicates the scale-plate across the top. 3 is a vertical piece whose lower end straddles and engages guide-rod 2 and whose upper end, connected to the carriage, is provided with the spring-pressed plunger 4 that carries the partial nut 5 for engagement with the feed-screw 6; this partial nut 5 is in two portions located longitudinally of the feed-screw and constituting a Y, and in the cut-away portion between them is located the ring 7 which surrounds the feed-screw and is provided with the manipulating-lever 8; this ring is likewise provided with the two cut-away portions 9 and 10, between which is the nose or cam 11. When the lever 8 is turned to the left (as in Fig. 2) or to the right (as in Fig. 3) the respective portions 9 and 10 permit the nut 5 to engage the feed screw; and when the lever 8 is turned in the intermediate position (as in Fig. 1) the nose 11 forces plunger 4 and nut 5 downward out of engagement with the feed-screw. All this is the usual "start-and-stop" construction as found in my U. S. Letters-Patent No. 569,290, dated Oct. 13, 1896. Upon the top of the carriage is shown a fixed handle 12<sup>a</sup> for convenience in shifting it from side to side of the machine.

Fixedly attached to the hollow casing 12 which constitutes a part of the carriage, is the tubular piece 13, shown as provided with the reduced outer end 14 (for receiving the flexible tube for the mouth-piece), and provided at its other end with a flange 15 by which it is screwed or otherwise secured to



the casing 12. Within fixed tube 13 is the telescoping-tube 16; and the spherical end of the trunnion-tube 17 is secured therein by the pivot 18 which permits tube 17 to have sufficient lateral swing, while the spherical head insures a practically air-tight joint. 19 is the "diaphragm head" of the recorder and reproducer, whose upper end (made spherical for the same purpose) is secured in the inner end of the trunnion-tube 17 by means of the horizontal pin 20, that permits up-and-down movement of the "head". Owing to these two pins 18—20, the head 19 is capable both of lateral and of up-and-down movement; while by reason of the telescoping-tube 16 it may be shifted in and out. A set-screw 21 extends upward through the bottom wall of fixed tube 13, where it engages the longitudinal slot 22 in the telescoping-tube 16, to prevent any axial swiveling of the latter. The head 19 has the usual diaphragm 23, that carries a recording-stylus 24, and slightly in advance thereof a reproducing-stylus 25,—the two extending in the same vertical plane transversely of the recording cylinder 26.

When the head 19 is shifted forward, as in Fig. 2, the recording-stylus 24 is in proper position to record upon cylinder 26, while the reproducing-stylus is out of engagement; whereas, when the head has been shifted back up into fixed tube 13 (as in Fig. 3), the recording-stylus is thrown out of position and the reproducing-stylus 25 is brought into operative position. Set-screw 21 and slot 22 guide this movement, so that the styluses may not be tilted out of the vertical plane.

The lower edge of ring 7 (of the "start-and-stop" device) is transversely slotted, as at 7', to receive the forward end of a link 27, which is pivoted to the nose 11 of said ring. At its rear the link engages telescoping-tube 16 by means of slot 28 passing over a transverse pin 29, upon the adjacent end of tube 16. This slotted connection at 28 permits the necessary play; while link 27 is held in proper engagement by means of spring 30, shown as carried within a tubular device 31, whose upper end is pivoted at 32 (upon the underside of casing 12), its lower end having a slotted engagement with link 27. Moving handle 8 forward (to the left, see Fig. 2), carries link 27 rearward (to the right), and extends head 19 to bring recording-stylus 24 into position; and when carried to the rear (to the right,—see Fig. 3), handle 8 shifts link 27 to the left and retracts head 19 to bring reproducing-stylus 25 into play.

A disk-like weight 33 (see Fig. 4) is located above the head 19, its central portion being cut away to provide the two members 34—34 that straddle the neck of head 19 and are pivoted at 35—35, upon the adjacent

inner end of trunnion-tube 17. The nose 36 on the outer end of weight 33 is adapted to engage the adjacent seat 37 in casing 12; and a little to the rear of nose 36 is shown a depending boss adapted to bear upon head 19. Near the upper end of the stem of head 19, and upon its under side, is the cam 38, separating recesses or seats 39 and 40. In the neutral position (Fig. 1) this cam rides upon the projected end of the set-screw 21, so that the head 19 and the weight 33 are tilted up (both of the styluses being thus disengaged), and the nose 36 of the weight is in position to become engaged in the seat 37; in either of the other two positions (Figs. 2 or 3) the end of the set-screw 21 rests in one of the two seats 39 or 40, and the head 19 is allowed to drop with one or the other of its two styluses in operative position.

The operation of my machine is as follows, referring first to Fig. 1, which shows the neutral position: The manipulating-lever 8 is vertical, its cam or nose 11 has forced downward the plunger 4 and has disengaged the partial nuts 5 from the feed-screw 6, whose rotation will no longer propel the carriage; at the same time the link 27, in its medial position, has shifted the head 19 to the position where its cam 38 (by riding upon the end of set-screw 21) has lifted the head 19 and the weight 33 so that both the styluses are out of engagement. The machine runs idly, the carriage is not propelled, and neither stylus acts upon the cylinder 26.

In order to record, a suitable blank-cylinder 26 being placed upon the mandrel and the operator ready to dictate into the mouth-piece,—the manipulating-lever 8 is turned forward (to the left, as in Fig. 2). The cut-away portion 9 of the ring 7 permits the partial-nuts 5 to engage the feed-screw, so that the carriage will be propelled along the machine; the link 27 (by completing its traverse to the right,) unseats the cam 38, and the seat 39 permits the head 19 to drop down until its recording-stylus 24 engages the cylinder 26,—meanwhile the nose 36 of the weight 33 has become engaged in the seat 37, thus relieving the head of the weight, and locking the trunnion-tube 17 and head 19 against lateral swing. Consequently head 19 now acts as a comparatively light recorder, being relieved of the weight 33; and the recorder is capable of up-and-down movement only.

In order to reproduce sound, the manipulating-lever 8 is first carried to the neutral (vertical) position (Fig. 1), and the entire carriage shifted back to the starting-point; and then the lever 8 is moved backward (to the right) as in Fig. 3. The cut-away portion 10 permits the partial-nuts 5 to engage the feed-screw 6, and the carriage is now



propelled; at the same time the link 27 has retracted the telescoping-tube 16 with its parts; the weight 33 is disengaged from seat 37 and rests upon the back of the head 19; and the cam 38 having passed entirely over the screw 21, the recess 40 permits the head 19 and the weight 33 to drop into the position shown in Fig. 3, where the reproducing-stylus 25 is in operative contact with the record-cylinder 26. There is now nothing to prevent the lateral play obtainable by means of the pin 18. Consequently the device has become a comparatively heavy reproducing-device susceptible not only of up-and-down movement, but also of the lateral play necessary to track in the record-groove.

The compactness and efficiency of my invention are noticeable. The simplicity of its operation is even more striking: When not in use the lever 8 stands upright; in order to dictate, the operator merely draws this lever forward and speaks into the mouth-piece; in order to reproduce he merely shifts the lever 8 in order to move the carriage to the beginning of the record, and then pushes lever 8 backward and listens to the reproduction.

In order to disassemble the parts as for cleaning or repairing, if the same should by any chance become necessary, all that is required is to remove the screws which secure flange 15 of the outer fixed tube 13 to the casing 12, and draw off the outer tube 13; then, if further access to the parts be desired, the forward end of link 27 may easily be lifted from the transverse pin 28, and the parts separated.

I have described the details of my invention with some particularity, but only for the sake of clearness since it will be understood that my invention is not limited to the precise construction and arrangement of parts herein set forth. Changes may be made therein and parts of the device used to the exclusion of other parts without departing from the spirit of my invention.

Having thus described my invention, I claim:

1. In a talking-machine, a comparatively heavy reproducer having both vertical and lateral play, in combination with means comprising a link for transforming the same into a comparatively light recorder having vertical play only.

2. In a talking-machine, a vertically-swinging recorder locked against lateral play and having a reproducing-stylus upon its diaphragm, in combination with a weight independent of said recorder, and means for bringing said reproducing-stylus into position while applying said weight to the same and permitting lateral play thereof.

3. In a talking-machine, a reproducer

having both lateral and vertical play and carrying a recording-stylus, an independent weight bearing upon said reproducer, and means for removing said weight while bringing said recording-stylus into position and locking it against lateral play.

4. In a talking-machine, the combination of a start-and-stop mechanism, a diaphragm, a recording-stylus mounted to be actuated thereby, a reproducing-stylus for actuating said diaphragm, said styluses being mounted to have lateral as well as vertical play, means locking said styluses against lateral play, a weight-device supported with its effective pressure not bearing upon said styluses, and connecting-means between said start-and-stop mechanism and the mounting for said styluses, whereby the shifting of said mechanism brings said reproducing-stylus into operative relation with the recording-tablet carried by said machine and releases said locking-means and applies the effective pressure of said weight-device upon said reproducing-stylus.

5. In a talking-machine, the combination of a start-and-stop mechanism, a diaphragm, a reproducing-stylus mounted to actuate the same, a recording-stylus to be actuated thereby, said styluses being mounted to have lateral as well as vertical play, means for locking said styluses against lateral play, a weight-device supported with its effective pressure bearing upon said styluses, and connecting means between said start-and-stop mechanism and the mounting for said styluses, whereby the shifting of said mechanism brings said recording-stylus into operative relation with the recording-tablet carried by said talking-machine and applies said locking-means and relieves said recording stylus of the effective pressure of said weight-device.

6. In a talking-machine, the combination of a head having both lateral and vertical play, a diaphragm therein that carries a recording-stylus and a reproducing-stylus, mechanism for shifting said head rectilinearly in order to bring either stylus into operation to the exclusion of the other, a pivoted weight-device independent of said head but adapted to rest thereon, and means actuated by the shifting operation aforesaid for locking said head against lateral play and relieving it of the weight of said device while the recording-stylus is in operation and for permitting said head to have lateral play and said weight to rest thereon while the reproducing-stylus is in operation.

7. In a talking-machine, a head having both lateral and vertical play, a diaphragm therein that carries a recording-stylus and a reproducing-stylus, means for shifting said head to bring either stylus into operation, means for adding weight to the head when the reproducer is in operation, means



for relieving said head of said weight and for locking it against lateral play when the recording-stylus is in operation, and in combination with the foregoing, a start-and-stop mechanism and means actuated thereby for operating all of the means before-mentioned.

8. In a talking-machine, a fixed tube upon the carriage, a telescoping-tube mounted therein, a trunnion-tube swinging laterally in the latter, a speaker swinging vertically in the trunnion-tube and having a diaphragm carrying a recording-stylus and a reproducing-stylus, a swinging weight mounted upon said trunnion-tube and resting upon said speaker, means for lifting said speaker and weight, means for locking said weight in its lifted position independent of the speaker, a start-and-stop mechanism, and connection between the latter and the telescoping-tube whereby either style is brought into position and the head and weight are lifted and the latter locked or the two allowed to drop into position.

9. In a talking-machine, a speaker-head having a diaphragm carrying a recording and a reproducing-stylus, said head being pivoted in a trunnion-tube to swing vertically and having a cam on the lower side of its neck, the said trunnion-tube being pivoted in a telescoping-tube to swing laterally and having a weight pivoted at its inner end to swing vertically to and from said head, the said weight having means for securing it out of contact with said head. said telescoping-tube having a longitudinal slot and having operative connection with the start-and-stop mechanism of the machine, and a stud coöperating with the last-named slot to guide the telescoping-tube and co-acting with the cam aforesaid to tilt the speaker-head.

10. In a talking-machine, a recorder having vertical play only and carrying a diaphragm provided with a reproducing stylus, start-and-stop mechanism for said machine, and means actuated by said mechanism for bringing said reproducing-stylus into position while permitting lateral as well as vertical play thereof.

11. In a talking-machine, a reproducer having both lateral and vertical play, and carrying a diaphragm provided with a recording-stylus, start-and-stop mechanism for said machine, and means actuated by said mechanism for bringing the recording-stylus into position while locking it against lateral play.

12. In a talking-machine, a recorder having vertical play only and carrying upon its diaphragm a reproducing-stylus, start-and-stop mechanism, and connecting-means between said mechanism and said recorder whereby shifting of said mechanism brings said reproducing-stylus into position while permitting lateral as well as vertical play thereof.

13. In a talking-machine, a reproducer having both vertical and lateral play and carrying upon its diaphragm a recording-stylus, start-and-stop mechanism, and connecting-means between said mechanism and said reproducer whereby shifting of said mechanism brings said recording-stylus into position while locking it against lateral play.

14. In a talking-machine, the combination of a recording-stylus and a reproducing-stylus located in the same plane and normally capable of lateral as well as vertical play, a diaphragm operatively related to said styluses, an independently mounted weight adapted to apply pressure upon said reproducing-stylus, and means for shifting said styluses in said plane to bring the recording-stylus into operative relation to the talking-machine tablet to the exclusion of the other stylus while removing the pressure of said weight and holding said recording-stylus locked against lateral play.

15. In a talking-machine, the combination of a recording stylus, a reproducing stylus having both lateral and vertical play, a weight shiftable to apply pressure to said reproducing stylus, and means for removing said weight while bringing said recording stylus into position, said recording stylus when in position being locked against lateral play.

16. In a talking machine, the combination of a recording stylus, a reproducing stylus having both lateral and vertical play, an independent weight shiftable to apply pressure to said reproducing stylus, and means for removing said weight while bringing said recording stylus into position, said recording stylus when in position being locked against lateral play.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

N. B. FLATHER,  
L. B. NICHOLSON.





1,100,107.

Patented June 16, 1914.

5 SHEETS—SHEET 1.

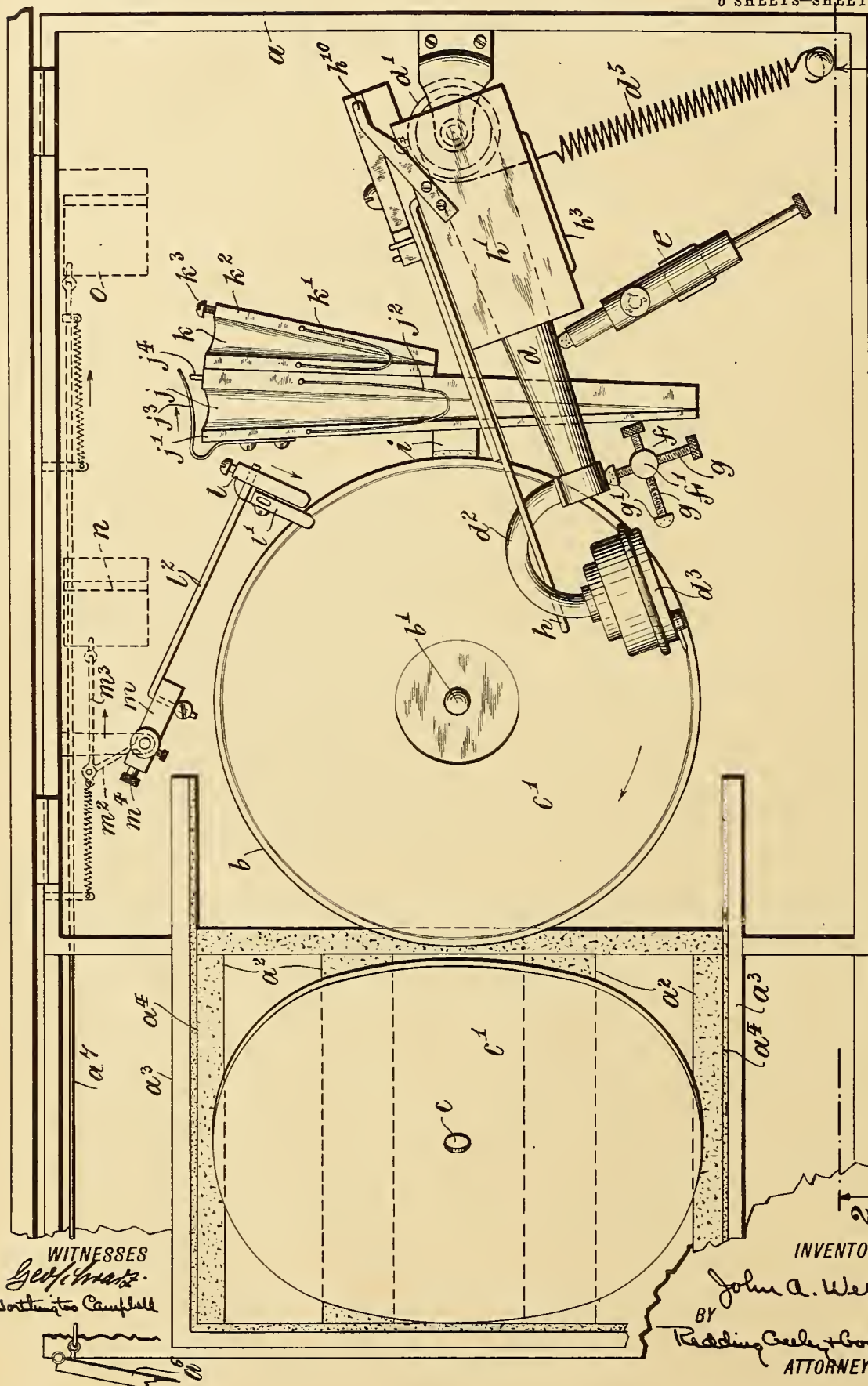


Fig. 1.

WITNESSES  
*Geo. H. H. H.*  
 Worthington Campbell

INVENTOR

*John A. Weser*  
 BY *Redding Gealy & Goodlett*  
 ATTORNEYS





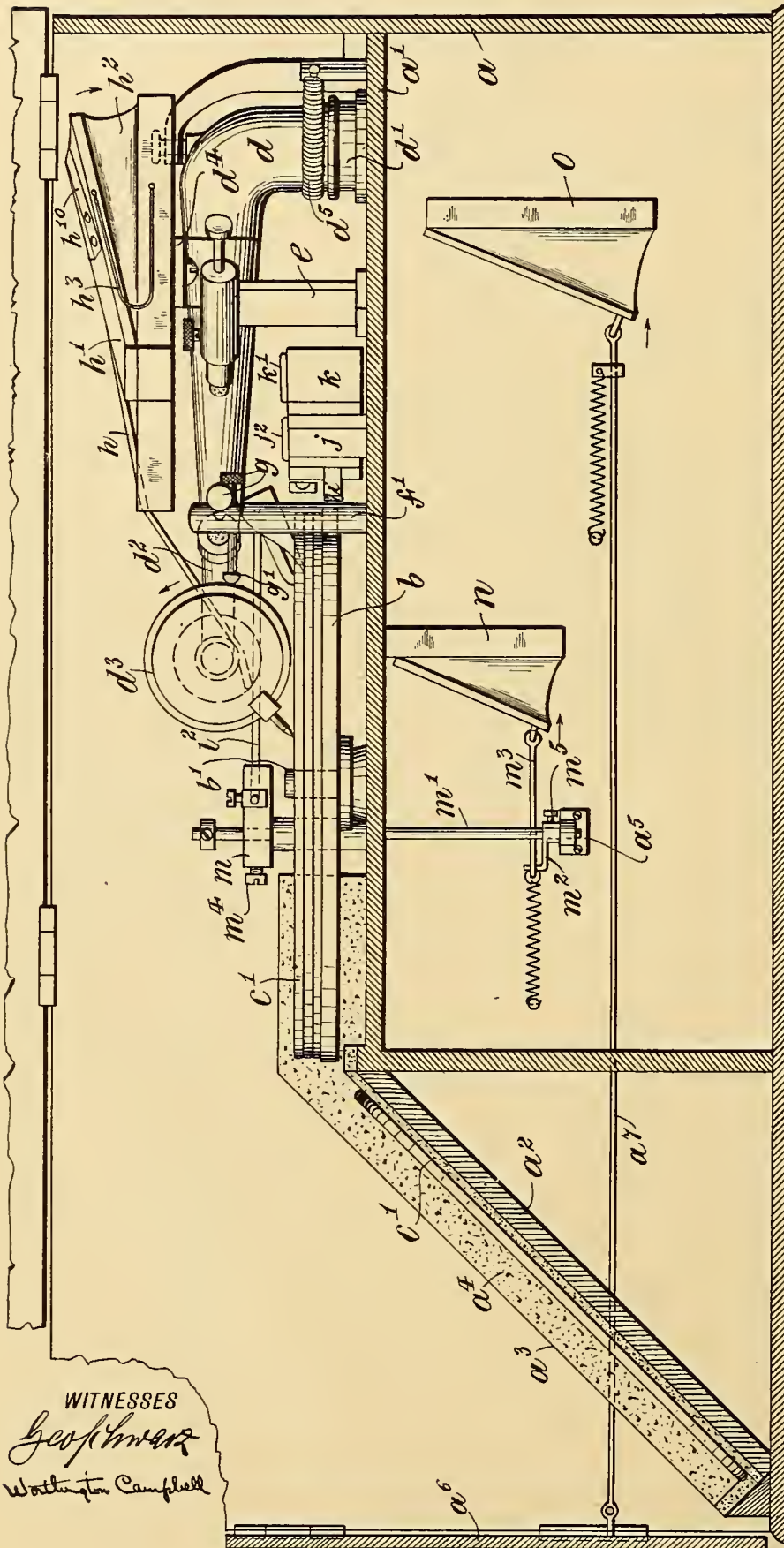
GRAPHOPHONE.

APPLICATION FILED APR. 3, 1913.

1,100,107.

Patented June 16, 1914.

6 SHEETS—SHEET 2.



*Fig. 2.*

WITNESSES  
Geo. H. Warr  
Worthington Campbell

INVENTOR

John A. Weser

BY Redding Greely & Goodlett  
ATTORNEYS





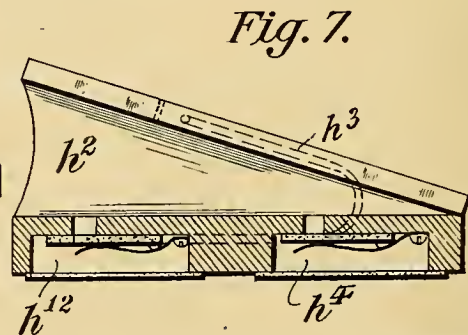
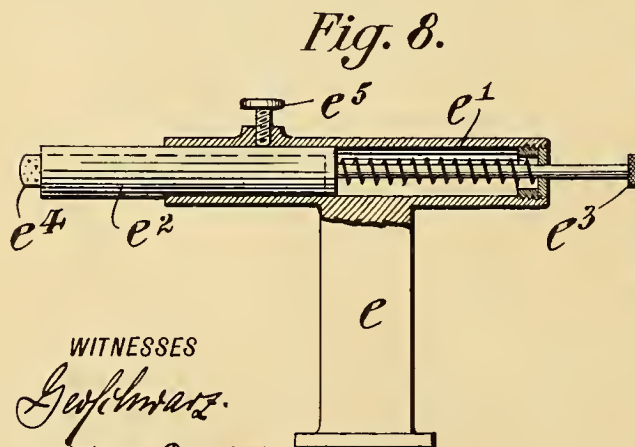
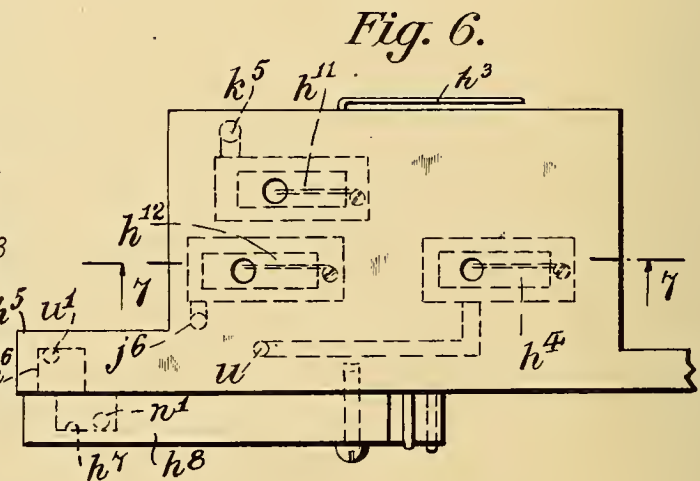
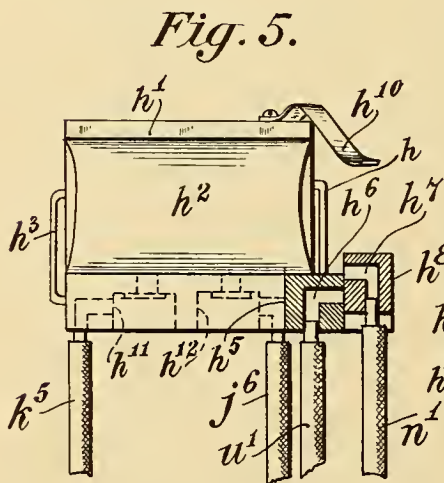
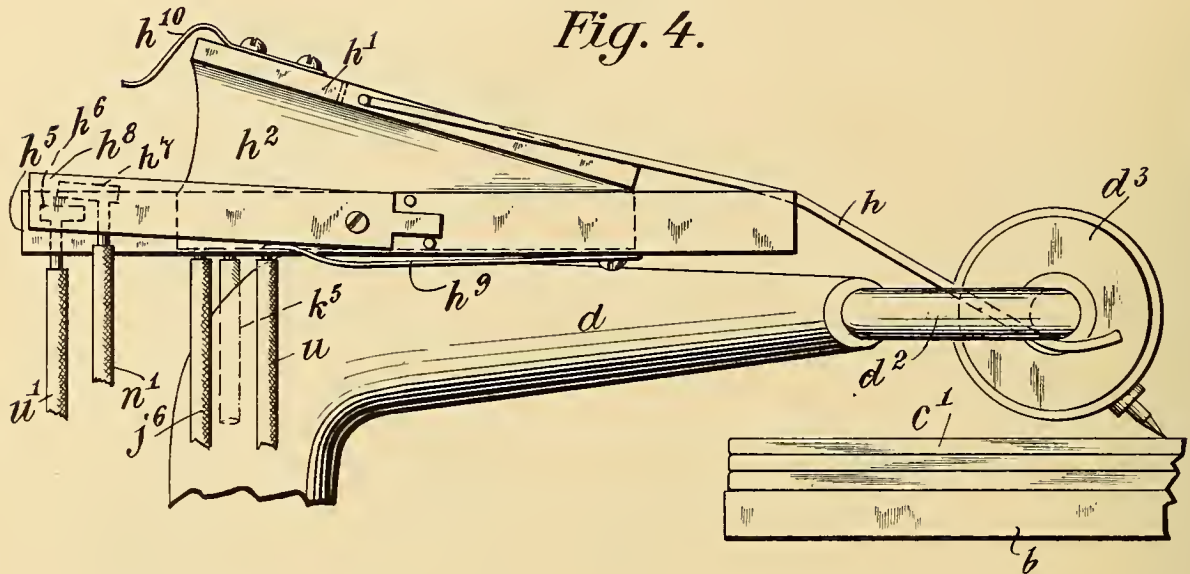




1,100,107.

Patented June 16, 1914.

5 SHEETS—SHEET 4.



WITNESSES  
*Geoff Schwartz.*  
 Worthington Campbell

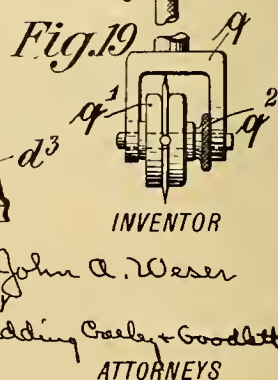
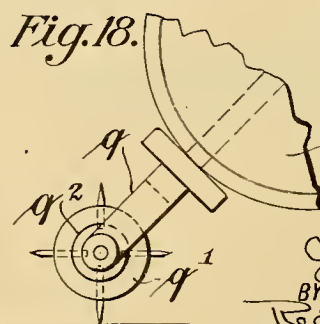
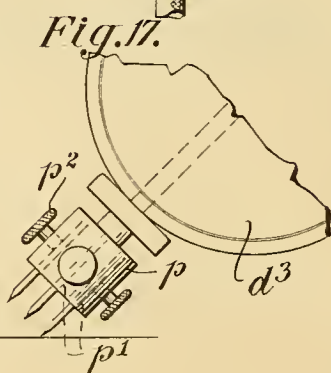
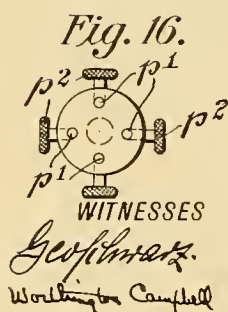
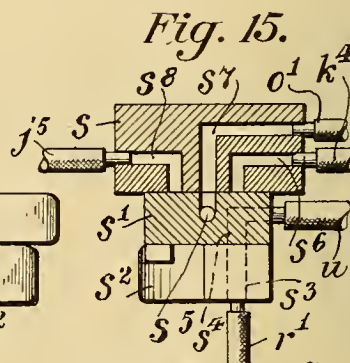
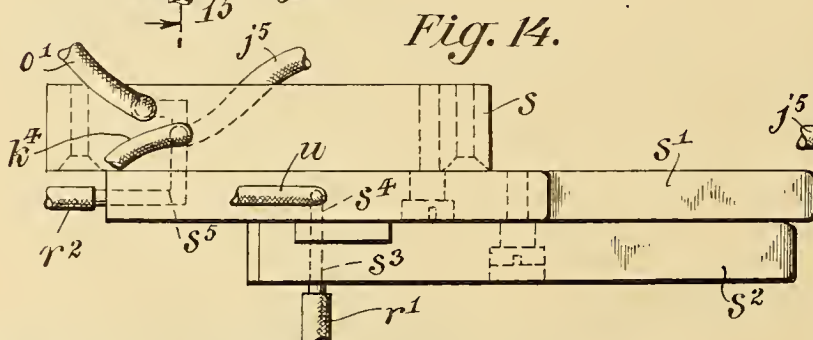
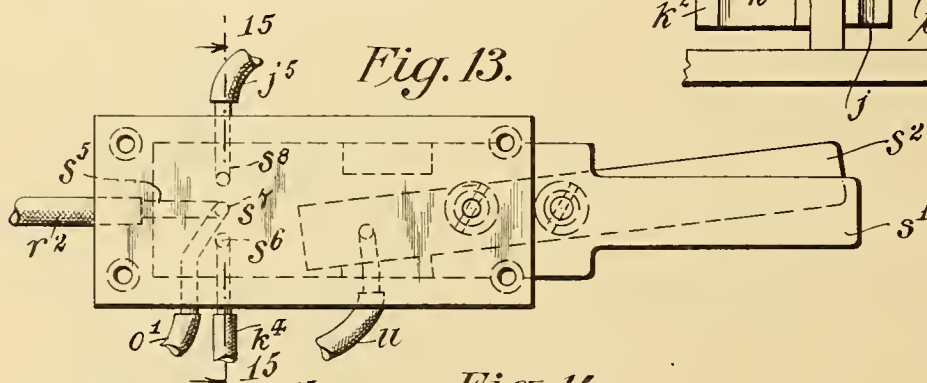
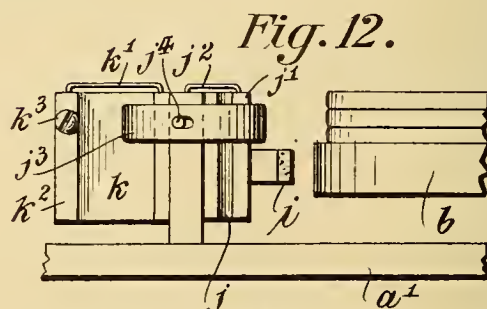
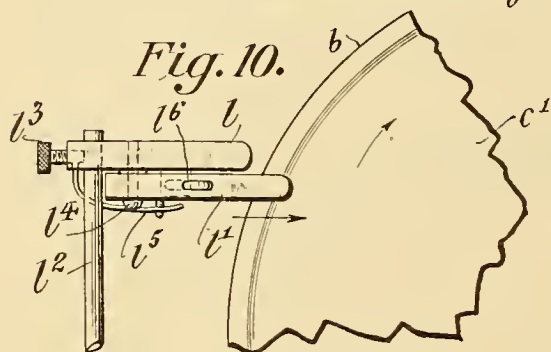
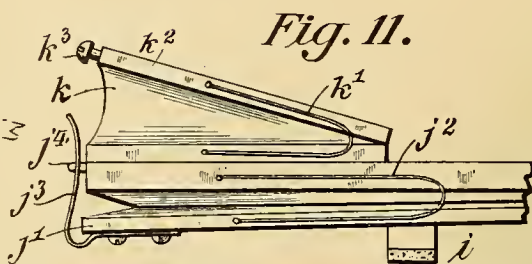
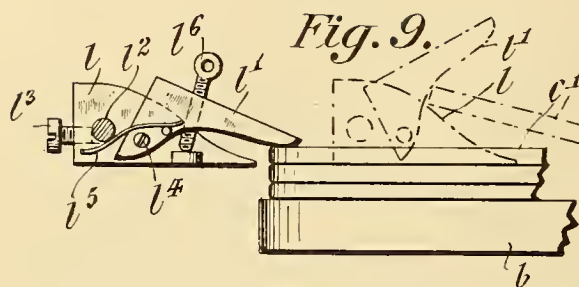
INVENTOR  
*John A. Weser*  
 BY  
*Redding Greely & Goodlett*  
 ATTORNEYS





1,100,107.

5 SHEETS—SHEET 5.



WITNESSES  
Geoffmertz.  
Worthington Campbell

INVENTOR

John A. Weser  
BY  
Fredding Cooley & Goodlett  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

JOHN A. WESER, OF NEW YORK, N. Y.

GRAPHOPHONE.

1,100,107.

Specification of Letters Patent.

Patented June 16, 1914.

Application filed April 3, 1913. Serial No. 758,586.

*To all whom it may concern:*

Be it known that I, JOHN A. WESER, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Graphophones, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

It has been proposed to control the operations of a graphophone by means acting automatically and in proper sequence whereby the proper starting and stopping thereof is effected and different records successively placed in operative position. Such means have usually been mechanically connected to the actuating mechanism of the disk turn table and once the device was set in motion various controlling devices had to perform their respective functions before a different record could be placed in position and the parts reset. Further, in these prior devices, it was not possible to repeat a portion of the composition on the particular record in operative position. The transfer of records in such arrangements has usually been effected by the bodily movement of suitable frame supports therefor and the means to effect the movement of the frames when desired have necessarily been too complicated and delicate for general use and did not admit of the application of the devices to any graphophone. Further, the control mechanisms have never been so related to each other and to a common source of power that those movements which should properly be coördinated and yet independent of other sequential control movements, could be initiated independently. Neither has any arrangement been provided to permit the operations of a graphophone to be controlled from a distance by an attendant.

Accordingly, it is an object of this invention to overcome the disadvantages hitherto encountered in automatically controlled graphophones and to provide a machine which shall be of comparatively simple construction, substantial in its nature, of relatively few moving parts, inexpensive to manufacture, invariable in its operation, susceptible of control at all stages of its operation and at a distance and generally of a character which shall commend itself to users of all classes.

A further object is to construct the controlling devices so that they may be readily attached to any graphophone without altering materially the construction of the latter.

In accordance with the invention, several records may be placed in superposed position on the turn table of the graphophone after which the prime mover therefor may be started. By an independent source of power and a pneumatic control disposed at any desired place, the sound box together with the needle may be lowered to operative position in engagement with the disk whereupon the composition thereof will be rendered. When desired, other pneumatically controlled devices may be set in motion to lift the needle from the record and permit the sound box to be returned to a predetermined starting position; the rotation of the turn table stopped; the uppermost record removed from its position on the turn table thus bringing the record immediately thereunder into operative position; the turn table released to permit its further rotation; and the sound box and needle lowered to engage operatively the uppermost record, after which the operations above outlined are repeated or modified at the will of the operator until the lowermost record has been removed from the turn table.

In the embodiment herein illustrated the several control devices are actuated pneumatically, a switch being provided at any desired place between the source of power and the several independent pneumatic controlling devices, whereby the latter are set in operation at will.

Further improvements will appear as this description proceeds, among which may here be mentioned the means for controlling the volume of sound to regulate the expression, means to insure automatically the return of the sound box to any desired predetermined position with respect to the record and a multiple needle holding device for the sound box.

The invention will be more fully described with reference to the accompanying drawings, in which—

Figure 1 is a view in plan of a graphophone embodying the present invention and showing certain of the pneumatic controlling devices, the latter being in the normal position immediately prior to the rotation of the turn table. Fig. 2 is a sectional view



taken on the plane indicated by the line 2—2 of Fig. 1 looking in the direction of the arrows. Fig. 3 is a diagrammatic view of the several control devices showing their connections to the common pneumatic control through the switch which is located at any desired place and adapted to be manually operated to set in motion any one of the series of pneumatic controls. Fig. 4 is an enlarged detail view in side elevation of a fragment of the sound box showing the pneumatic control device for raising and lowering the same. Fig. 5 is a view in end elevation of the bellows shown in Fig. 4 and illustrating the automatically actuated valve connected thereto and operable to place one of the independent control devices under the influence of the master bellows. Fig. 6 is a plan view of the bellows shown in Fig. 4 illustrating in dotted lines the independent connections thereto from the master bellows. Fig. 7 is a view taken on the plane indicated by the line 7—7 of Fig. 6. Fig. 8 is a detail view partially in section of an adjustable stop whereby the return of the sound box to a predetermined starting position is insured. Fig. 9 is a fragmentary view showing the relation of the record changing means to the records. Fig. 10 is a fragmentary view in plan of the devices shown in Fig. 9. Fig. 11 is a fragmentary view in side elevation of the two bellows controlling respectively the starting and stopping of the turn table, the parts being shown in released position. Fig. 12 is a fragmentary view in end elevation of the devices shown in Fig. 11. Fig. 13 is a view in plan of the controlling switch which may be located at any desired place and connected through suitable tubing to the master bellows and the several pneumatic controls. Fig. 14 is a view in side elevation thereof. Fig. 15 is a view taken on the plane indicated by the line 15—15 of Fig. 13 and looking in the direction of the arrows. Figs. 16 and 17 are detail views of an improved multiple needle-holder. Figs. 18 and 19 are detail views of a modified form of multiple needle holder. Fig. 20 is a view in plan of the master bellows illustrated in Fig. 3.

In the following description the various parts entering into the construction of an improved graphophone embodying the present invention will be described with reference to their novel features of construction and their function, after which the complete system by which the several devices are controlled will be taken up and described particularly with reference to the relation of the master bellows, the controlling switch and the several groups of related pneumatic controlling devices.

For the purpose of this description a graphophone of ordinary construction is

herein illustrated, being composed of the usual operating parts disposed substantially in their ordinary relationship each to each and performing their respective well known functions.

As the description proceeds it will be evident that the invention is applicable to any graphophone of the disk-record type. The graphophone proper may be disposed within a suitable cabinet *a* having a horizontal partition *a'* therein for the support of the usual operating devices and beneath which may be disposed the actuating motor (omitted herein for the sake of clearness) for the turn table *b*, the latter having a post *b'* coincident with its axis and adapted to extend through the usual central apertures *c* of the disk records *c'* which are supported by the table. On the horizontal partition *a'* is also mounted the usual *d* having a swivel connection with its base *d'* to permit its free movement in a horizontal plane and having swiveled thereto the usual goose-neck pipe *d<sup>2</sup>* in connection with the sound box *d<sup>3</sup>*, all as in a manner well known. One end of the horizontal partition *a'* terminates adjacent a downwardly extending flat support *a<sup>2</sup>* which may be provided with side walls *a<sup>3</sup>* and lined with a resilient covering *a<sup>4</sup>*, for a purpose which will later appear herein. It should be noted here that while the relationship of the parts thus far described may be changed at will, it is necessary that the inclined open receptacle last described, comprising the floor *a<sup>2</sup>* and side walls *a<sup>3</sup>*, lie in juxtaposition to the turn table so as to receive the records therefrom, from time to time during the operation of the graphophone.

A feature of the invention hereinbefore referred to and which might properly be described at this point resides in the provision of suitable buffers designed to limit the movement of the sound horn in one direction so that the sound box may be stopped in a predetermined position with respect to the record disk. In the present embodiment two such buffers are described, one, as illustrated in detail in Fig. 8, being designed primarily for the "repeat" of an entire record disk, and the other, shown best in Fig. 1, being intended primarily for the "repeat" of portions only of the composition of the record. The first named buffer, herein designated generally by the reference character *e*, is mounted rigidly on the horizontal partition *a'* and includes a horizontal tubular portion *e'* in which is disposed a spring pressed plunger *e<sup>2</sup>* having a suitable handle *e<sup>3</sup>* at one end adapted to be grasped by the operator and a suitable resilient cushion *e<sup>4</sup>* at the other end with which the tone arm *d* contacts as will presently appear. The tubular portion *e'* has threaded therein a set screw *e<sup>5</sup>* by which the position of the



plunger  $e^2$  with respect to the sound horn  $d$  may be adjusted so that the movement of the latter is stopped in one direction invariably at a predetermined point. When it is desired to repeat a portion only of a record the other buffer device  $f$  is preferably employed. This last named buffer comprises a vertical stud  $f'$  carried rotatably by the horizontal partition  $a'$  and having threaded therethrough a plurality of horizontally disposed buffer studs  $g$  carrying suitable cushions  $g'$  at one end to contact with the tone arm  $d$  in a manner similar to that pointed out with respect to the buffer  $e$ . By employing the buffer device  $f$  as many predetermined repeat positions for the sound horn may be secured as there are horizontal threaded studs  $g$  and so, by rotating the buffer device to bring the proper cushioned stud in operative position for successive records, the favorite portions of each record may be repeated without interrupting the rendition thereof to adjust the stop. While it has been stated that the buffer devices  $e$  and  $f$  above described have especial application to the repeat of records under certain conditions it is to be understood that either may be used as repeat stops under all circumstances.

The sound box  $d^3$  with its needle may be lowered or raised from operative position by means of an arm  $h$  which preferably extends through the goose-neck pipe  $d^2$  and has one end lying thereunder so that when this last named end is raised the sound box will be raised in a manner similar to that employed when the box is raised manually by the insertion of a finger under the goose-neck pipe. The other end of the lever  $h$  is secured to the movable member  $h'$  of a bellows  $h^2$  carried by a suitable bracket  $d^4$  secured on the sound horn  $d$  and movable therewith. This bellows  $h^2$  is normally held in distended position by a spring  $h^3$  as is usual in such devices. When the bellows  $h^2$  is in its distended position as is illustrated in Fig. 4, the sound box  $d^3$  and its needle rest by gravity in operative position on the face of the uppermost disk record  $c'$ . When it is desired to raise the sound box  $d^3$  and its needle from this position the bellows  $h^2$  is collapsed, thus swinging upwardly the outer end of the lever  $h$  together with the goose-neck pipe  $d^2$  which rests thereon. When the needle is released from its engagement with the record disk in the manner just pointed out, the tone arm  $d$  is brought under the action of a suitable spring  $d^5$  which serves to move the same toward its initial position. As pointed out before, however, this swinging movement of the tone arm  $d$  may be stopped either in its inward starting position, as by the buffer  $e$ , or at any predetermined "repeat" point, as by means of the buffer  $f$ .

To stop the rotation of the turn table  $b$  or to permit its rotation, a suitable brake  $i$  is provided by two bellows  $j$  and  $k$ , lying in juxtaposition to each other and supported on the horizontal partition  $a'$ . The movable member  $j'$  of the bellows  $j$  may carry the brake  $i$ , and its movable member is so disposed with respect to the periphery of the turn table as to bring the brake  $i$  in engagement therewith when the bellows is in its distended position. The bellows  $j$  and  $k$  are normally held in their distended position by springs  $j^2$  and  $k'$  respectively, as will be understood. To permit the turn table  $b$  to rotate under the action of its motor, the bellows  $j$  is collapsed, thus withdrawing the brake  $i$  from engagement with the periphery of the table. The bellows  $j$  is held in this collapsed position by the engagement of a suitable leaf spring  $j^3$  carried on the movable member  $j'$  which has a slot adapted to engage releasably a stud  $j^4$  mounted on the immovable member of the bellows, as appears most clearly in Figs. 11 and 12. When it is desired to start the rotation of the turn table  $b$  the bellows  $k$  is collapsed so that its movable member  $k^2$  which carries a stud  $k^3$  in its end, will bring the stud  $k^3$  in operative engagement with the leaf spring  $j^3$  so as to disengage the latter from the stud  $j^4$  and permit the bellows  $j$  to become distended so that the brake  $i$  is brought into contact with the periphery of the turn table  $b$ .

After the composition of the uppermost record  $c'$  has been rendered and perhaps repeated wholly or partially at the will of the operator, it is proposed in accordance with the present invention to have the same removed by suitable means also under the control of the operator so as to bring the disk immediately thereunder in operative position with respect to the sound box  $d^3$  and its needle. When this is brought about, the movements before described may be repeated with respect to the new disk. The mechanism for removing the uppermost record comprises a cam finger  $l$  which is adapted to be slid under the record and a spring pressed cam finger  $l'$  carried thereby and reversely disposed with respect thereto to engage the upper face of the record. The finger  $l$  is adjustably secured to one end of an arm  $l^2$  by means of a set screw  $l^3$ . The other end of the arm  $l^2$  is journaled loosely in a suitable support  $m$  secured to a vertical shaft  $m'$  rotatably mounted in a bracket  $a^5$  carried by the cabinet  $a$  (see Fig. 2). The shaft  $m'$  in turn, is operatively connected to a bellows  $n$  also secured to the cabinet  $a$ , through suitable links  $m^2$  and  $m^3$ . The angular relation of the support  $m$  to the shaft  $m'$  as well as the angular relation of the link  $m^2$  thereto, may be fixed by suitable set screws  $m^4$  and  $m^5$  respectively. Return-



ing now to the fingers  $l$  and  $l'$  briefly referred to above, it will be seen that the uppermost finger  $l'$  is pivotally mounted on the finger  $l$  on a stud  $l^4$  and moves upwardly with respect to the lower finger  $l$  against the action of a suitable leaf spring  $l^5$  operatively interposed between the two fingers. The normal relationship of these fingers may be fixed by means of an adjusting screw  $l^6$  threaded in one finger  $l'$  and engaging the other finger  $l$ .

The upper finger  $l'$  rests at all times on the upper face of the uppermost record, while the lower finger  $l$  is adjusted with respect to the upper finger by means of the stud  $l^6$ , so that the lower finger has its outer edge substantially in the same plane with the under face of said record. When it is desired to remove the uppermost record  $c'$  the bellows  $n$  is collapsed, rotating the vertical shaft  $m'$  and swinging the support  $m$ , arm  $l^2$  and fingers  $l$  and  $l'$  inwardly radially with respect to the record. The cam surface of the finger  $l$  is so formed that the initial movement of the disk record thereon is upwardly against the action of the upper finger  $l'$  and its spring  $l^5$ . This upward movement of the disk serves to bring its aperture  $c$  out of engagement with the vertical post  $b'$  of the table  $b$  so that by continued inward movement of the fingers, the record is slid bodily toward the inclined support  $a^2$ . As appears from Figs. 1 and 2, when the record is slid outwardly to a point where it is overbalanced, it falls on said incline and is guided in its movement to a position of rest by the side walls  $a^3$  thereof. By suitable manipulation of the controlling valve, hereinafter described, the bellows  $n$  may now be allowed to collapse so as to swing the arm  $l^2$  and the intermediate connections back to their normal position in which the upper finger  $l'$  rests on the disk immediately below the one removed. The other parts before described may then be set in motion to render the composition of the uppermost record.

It may be desirable at times to control the volume of sound in accordance with the nature of the selection and so the cabinet  $a$  is here illustrated as provided with a shutter  $a^6$  hinged in one of its side walls. This shutter  $a^6$  is connected through suitable links  $a^7$  to a bellows  $o$  suitably secured within the cabinet. In the embodiment illustrated, when the bellows  $o$  is collapsed the shutter  $a^6$  is closed and for all intermediate positions of the bellows  $o$  when being distended the shutter is opened a corresponding extent.

From the description thus far given, it is thought that the desirability of employing a multiple needle holder to permit a fresh needle to be brought into place quickly, will now be appreciated. One form of such a

needle holder is illustrated in Figs. 16 and 17. This comprises an annular carrier  $p$  provided with a plurality of recesses  $p'$  in one end to receive the needles, which may be secured therein by suitable set screws  $p^2$  and having the other end in operative connection with the sound box  $d^3$  in the ordinary manner. In use, any one of the needles may be brought into operative position quickly with respect to the record by rotating the support  $p$ , as will be obvious.

A slightly modified form of a multiple needle carrier is shown in Figs. 18 and 19. This comprises a suitable yoke  $q$  carried by the sound box  $d^3$  and having journaled in its branches a holder  $q'$ , in the periphery of which may be disposed a plurality of needles. The annular holder  $q'$  is formed with two relatively movable portions between which are disposed the needles. These portions may be moved relatively by means of a suitable milled nut  $q^2$  in a manner which will be obvious to a skilled mechanic and which need not here be illustrated in detail.

The parts constituting the improved graphophone and controlling devices therefor having now been described with sufficient detail, the control system for these several devices will now be considered. In this connection reference is to be had particularly to the diagrammatic view of Fig. 3. In this figure, in the interest of clearness, the sound box and sound horn together with their controlling bellows have been shown in side elevation, while the break bellows, the record shifting mechanism and the expression shutter have been shown in plan. The master bellows is in the present embodiment adapted to be operated manually, but it is to be understood that any master bellows controlled by mechanical or pneumatic devices may be substituted. Such an arrangement would be especially desirable when the improved graphophone is used in connection with a pneumatic piano player or the like.

The master bellows  $r$  has connection, through suitable piping  $r'$  and  $r^2$  with a controlling valve or switch which may comprise a member  $s$ , secured for the sake of convenience on a table  $t$  or the like and having pivotally secured thereto a valve member  $s'$  on which is pivotally secured a second valve member  $s^2$ . The location of the switch with respect to the graphophone and to the master bellows may be changed as desired. As shown particularly in Figs. 13, 14 and 15, the master bellows connection  $r'$  terminates in a port  $s^3$  extending through the valve member  $s^2$  and adapted to be placed in registry with a second port  $s^4$  formed in the adjacent valve member  $s'$ . The other connection  $r^2$  from the master bellows  $r$  terminates in a port  $s^5$  formed in the valve member  $s'$ , which may be placed in registry with any



one of three ports  $s^6$ ,  $s^7$  or  $s^8$  formed in the immovable switch member  $s$ .

Between the port  $s^4$  in the valve member  $s'$  above described and one of three chambers  $h^4$  (indicated in dotted lines in Fig. 6) in the bellows  $h^2$  is a pipe connection  $u$ , by which the bellows  $h^2$  may be collapsed as will later appear. The connection  $u$  has leading therefrom a branch connection  $u'$  which terminates in an immovable valve member  $h^5$  carried by the bellows  $h^2$ . This valve member  $h^5$  has a port  $h^6$  with which is adapted to register a port  $h^7$  formed in a movable member  $h^8$  pivotally secured to the immovable valve member  $h^5$ . The movable valve member  $h^8$  is normally held so that its port  $h^7$  is out of registry with the port  $h^6$  of the immovable valve member  $h^5$  by means of a suitable leaf spring  $h^9$ . When the bellows  $h^2$  is collapsed, however, the movable valve member  $h^8$  is moved to a position where the port  $h^7$  is in registry with the port  $h^6$  of the valve member  $h^5$ , by an arm  $h^{10}$  secured on the movable part  $h'$  of the bellows  $h^2$ .

It will now appear that when the valve member  $s^2$  is moved by the operator to bring its port  $s^3$  in registry with the port  $s^4$  of the valve member  $s'$ , that the master bellows  $r$  is placed in connection with the chamber  $h^4$  of the bellows  $h^2$  through the pipe  $u$  and also in connection with the port  $h^6$  of the immovable valve member  $h^5$  through the branch pipe  $u'$ . If the master bellows be distended when the parts are in this position, the bellows  $h^2$  will be collapsed, thus raising the sound box from the record, in the manner before described, and the port  $h^7$  of the movable valve member  $h^8$  will be brought into registry with the port  $h^6$  of the valve member  $h^5$  by the pressure thereon of the arms  $h^{10}$ . The port  $h^7$  of the movable valve member  $h^8$  is in operative connection with the bellows  $n$  of the record changing device through a suitable pipe  $n'$ . Accordingly, with the parts in the position above indicated, practically simultaneously with the lifting of the sound box, the air will be exhausted from the bellows  $n$  and the record changing device will become operative to remove the uppermost record as described hereinbefore. When the master bellows  $r$  is permitted to assume its closed position, the record shifting mechanism will return to its normal position and the sound box will be lowered in the manner before indicated.

The three ports  $s^6$ ,  $s^7$  and  $s^8$  in the immovable switch member  $s$  communicate through the pipes  $k^4$ ,  $o'$  and  $j^5$  with the bellows  $k$  by which the rotation of the turn table  $b$  is stopped; with the expression bellows  $o$  by which the shutter  $a^6$  is controlled and with the starting bellows  $j$  by which the rotation of the turn table is brought about. If the port  $s^6$  which is in connection with the master

bellows  $r$  through the connection  $r^2$ , be brought into registry by suitable manipulation of the valve member  $s'$ , with any one of the three ducts  $s^6$ ,  $s^7$  or  $s^8$  above referred to, the corresponding control pneumatic will be actuated in the manner fully described.

The connection  $k^4$  from the port  $s^6$  to the stop bellows  $k$  has a branch  $k^5$  in communication with a chamber  $h^{11}$  in the interior of the needle controlling bellows  $h^2$ . The port  $s^8$  has in its connection  $j^5$  to the starting bellows  $j$ , a branch connection  $j^6$  in communication with a third chamber  $h^{12}$  formed in the needle controlling bellows  $h^2$ . The effect of these branch connections  $k^5$  and  $j^6$  to the interior of the needle controlling bellows  $h^2$  is to control the position of the needle with respect to the record, substantially simultaneously with the operation of the starting or stopping of the turn table  $b$  as the case may be, in a manner similar to that pointed out with respect to the record changing mechanism.

It will now be evident that by suitable manipulation of the movable switch members  $s'$  and  $s^2$ , that the needle may be removed from the record at any time and the uppermost record automatically removed to permit the playing of the succeeding record. Then too, by suitable manipulation of the valve member  $s'$  with respect to the immovable valve member  $s$ , the expression may be controlled by opening or shutting the expression shutter  $a^6$ . Likewise, the sound box may be raised and the rotation of the turn table  $b$  stopped, or the sound box may be raised and the rotation of the turn table  $b$  permitted until the desired speed thereof is attained when the needle may be lowered to operative engagement with the face of the record.

The system set forth in Fig. 3 is especially susceptible of modification both with respect to the piping, the form of the controlling switch members, the nature of the master bellows and the form and relationship of the various controlling devices.

I claim as my invention:

1. In combination with a graphophone and its turn table, pneumatic devices to control the starting and stopping of the turn table and independent pneumatic means to actuate the pneumatic devices.

2. In combination with a graphophone and its turn table, pneumatic devices to control the starting and stopping of the turn table and manually operable means to control the operation of the pneumatic devices at the will of the operator.

3. In combination with a graphophone, pneumatic devices to change the records.

4. In combination with a graphophone, pneumatic devices to change the records and means to control the operation of the pneumatic devices.



5. In combination with a graphophone having a turn table, pneumatic devices to stop the rotation of the turn table and change the records, and means to control the operation of the pneumatic devices.

6. In combination with a graphophone having a turn table, devices to change the records including reversely disposed fingers pivotally connected, the upper finger resting normally on the upper face of the record on the turn table adjacent its edge and the lower finger being disposed substantially in the plane of the under face of the record, an arm on which said fingers are carried, a pneumatic, operative connections between the arm and the pneumatic whereby upon operation of the latter the fingers are moved inward substantially radially with respect to the record to remove the same from the turn table and means to control the operation of the pneumatic.

7. In combination with a graphophone having a turn table, devices to change the records including reversely disposed cam fingers pivotally connected, a spring interposed between the fingers to press the same together, the upper finger resting normally on the upper face of the record on the turn table adjacent its edge and the lower finger being disposed substantially in the plane of the under face of the record, a hinged arm on which said fingers are carried, a pneumatic, operative connections between the arm and the pneumatic whereby upon operation of the latter the arm is swung inward with respect to the record to give the fingers a radial movement with respect thereto to simultaneously raise and remove the record from the turn table, the reverse operation of the pneumatic serving to return the fingers to normal position, and means to control the operation of the pneumatic.

8. In combination with a graphophone having a turn table, devices to change the records including reversely disposed cam fingers pivotally connected, a spring interposed between the fingers to press the same together, the upper finger resting normally on the upper face of the record on the turn table adjacent its edge and the lower finger being disposed substantially in the plane of the under face of the record, a hinged arm on which said fingers are carried, a pneumatic, operative connections between the arm and the pneumatic whereby upon the operation of the latter the arm is swung inward with respect to the record to give the fingers a radial movement with respect thereto to simultaneously raise and remove the record from the turn table, an inclined support having a covering of cushioning material to receive the record from the turn table, and means to control the operation of the pneumatic.

9. In combination with a graphophone

having a traveling sound box swiveled to the tone arm and a needle, a pneumatic carried by the arm and engaging the sound box to control the position of the needle with respect to the record and means to control the operation of the pneumatic.

10. In combination with a graphophone having a traveling sound box swiveled to the tone arm, a bellows carried by the arm, an arm secured to the movable member of the bellows and having its free end in operative engagement with the sound box and means to control the operation of the bellows.

11. In combination with a graphophone having a revoluble turn table, a pneumatic, a brake carried on the pneumatic to control the movement of the turn table and means to control the operation of the pneumatic.

12. In combination with a graphophone having a revoluble turn table, a pneumatic, a brake carried on the pneumatic to control the movement of the turn table, means to hold the brake in operative and in inoperative positions, a second pneumatic to release the brake from one of said positions, and means to control the operation of both of said pneumatics.

13. In combination with a graphophone having a revoluble turn table, a bellows, a brake carried on the movable member of the bellows to control the movement of the turn table, a spring to hold the bellows distended with the brake in operative position, a spring leaf carried by the movable member of the bellows, a stud mounted on the immovable member thereof to coact with the spring leaf to hold the bellows in collapsed position with the brake in inoperative position, a second bellows mounted in juxtaposition to the first bellows, means carried by the movable member of the second named bellows to release the movable member of the first named bellows to permit the brake to move to operative position and means to control the operation of both of said bellows.

14. In combination with a graphophone having a needle, pneumatic devices to control the operation thereof, including the rotation of the record and the position of the needle with respect thereto, pneumatic means to actuate the pneumatic devices, and means interposed between said actuating means and the pneumatic devices to permit the control of the operation of each of the latter at the will of the operator.

15. In combination with a graphophone having a needle, pneumatic devices to control the position of the needle with respect to the record, pneumatic devices automatically operable to stop the rotation of the record when the needle is raised from the record and means to permit the control of the operation of the first of said pneumatic devices at the will of the operator.

16. In combination with a graphophone having a needle and a turn table, pneumatic devices to control the position of the needle with respect to the record, pneumatic devices to control the rotation of the turn table, means to actuate said devices, and means interposed between said actuating means and said pneumatic devices to control the operation of the latter, the pneumatic controlling devices of the needle and of the turn-table being so connected with the actuating means as to insure automatically the lifting of the needle momentarily prior to the rotation of the record.

17. In combination with a graphophone having a turn table, pneumatic devices to control the rotation of the turn table, pneumatic devices to change the records, means to place certain of said pneumatic devices in communication automatically to cause sequential operations, means to actuate said

devices, and means interposed between the actuating means and said devices to control the operation of the latter.

18. In combination with a graphophone having a needle and a turn table, pneumatic devices to control the rotation of the turn table, pneumatic devices to control the position of the needle with respect to the record, means to move the needle toward its initial starting position when raised from the record, adjustable means to limit the movement of the needle toward its initial starting position and means to permit the control of the operation of the pneumatic devices at the will of the operator.

This specification signed and witnessed this first day of April A. D. 1913.

JOHN A. WESER.

Signed in the presence of—

WINFIELD S. WESER,  
W. H. KEATING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



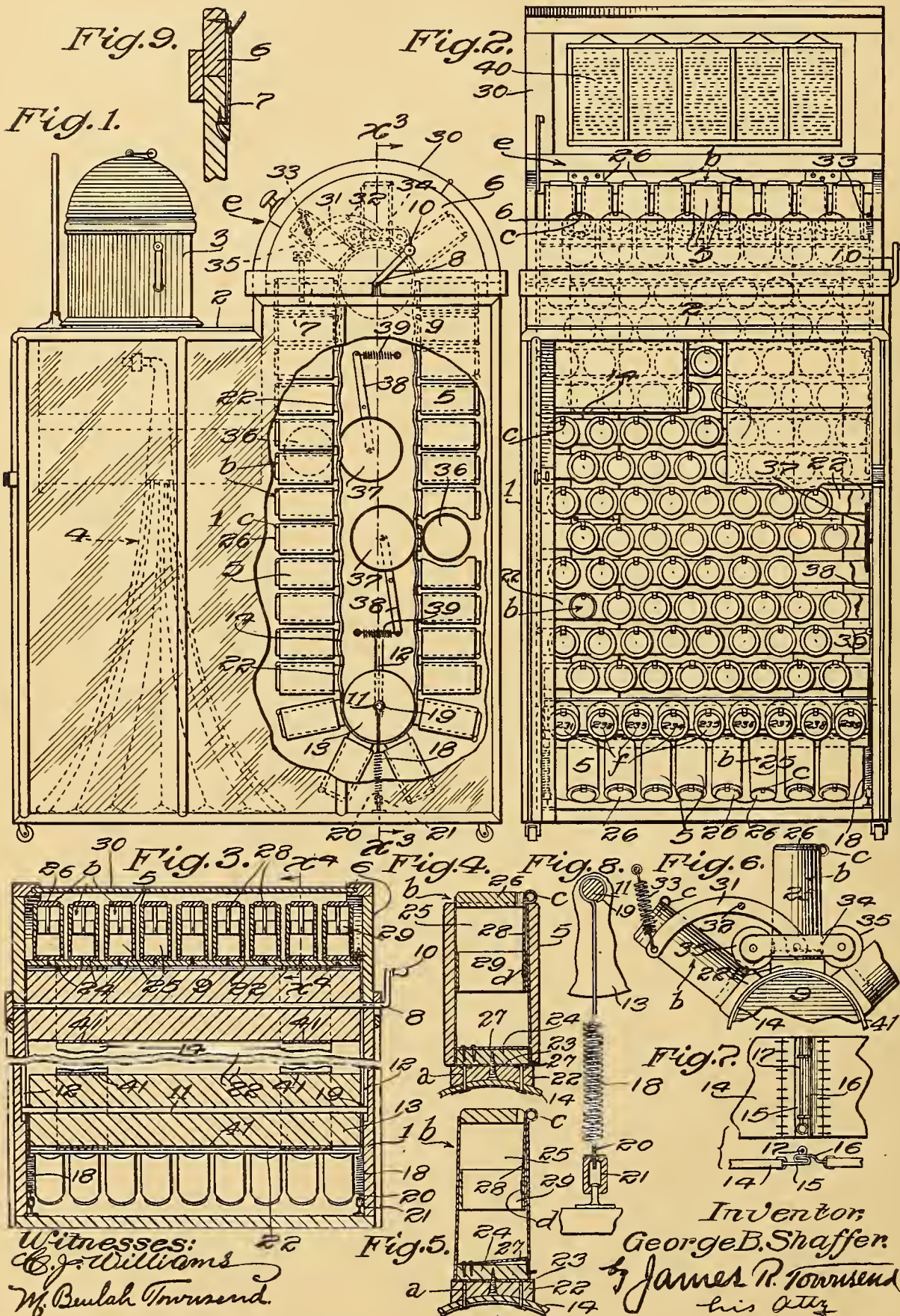




1,100,401.

Patented June 16, 1914.

3 SHEETS—SHEET 1.



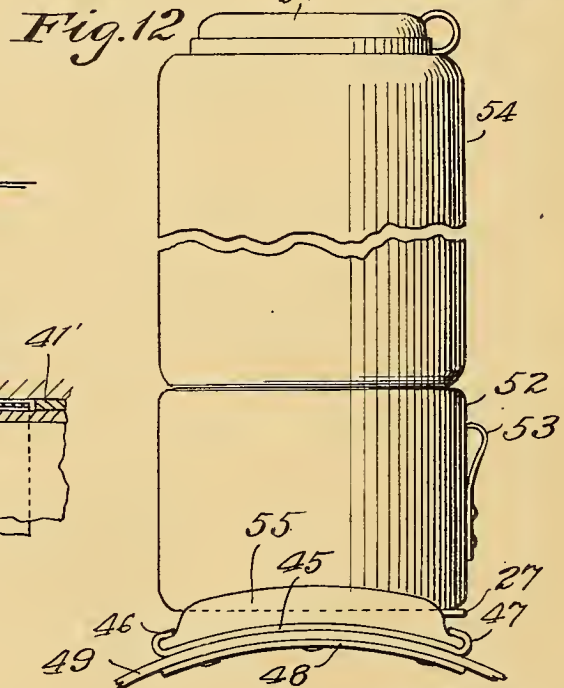
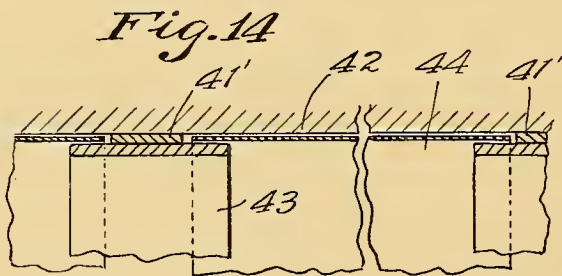
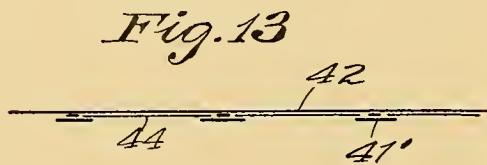
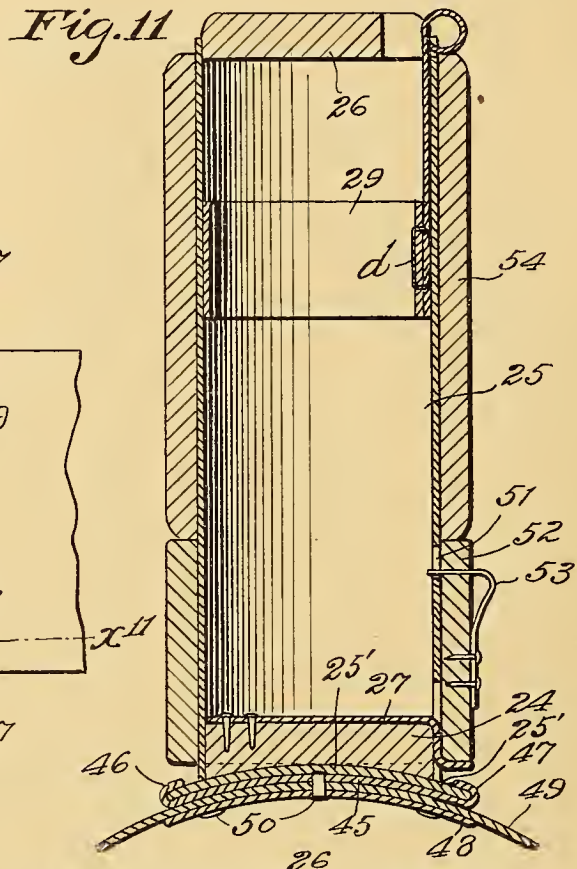
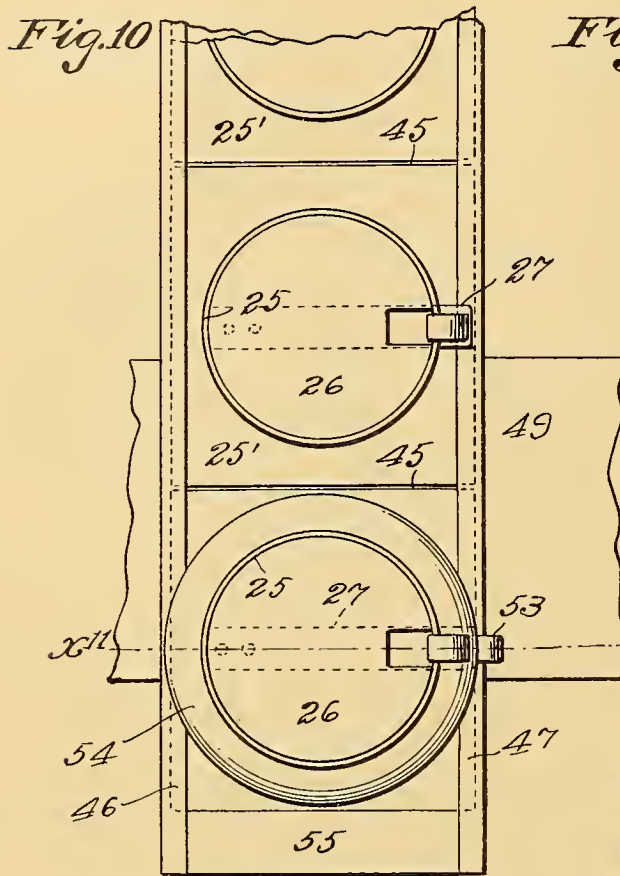




1,100,401.

Patented June 16, 1914.

3 SHEETS—SHEET 2.



Witnesses  
C. C. Holly.  
S. G. Wells.

Inventor  
George B. Shaffer  
James R. Townsend  
his atty.



G. B. SHAFFER.  
CABINET FOR PHONOGRAPH RECORDS.  
APPLICATION FILED OCT. 1, 1908.

1,100,401.

Patented June 16, 1914.

3 SHEETS—SHEET 3.

Fig. 17

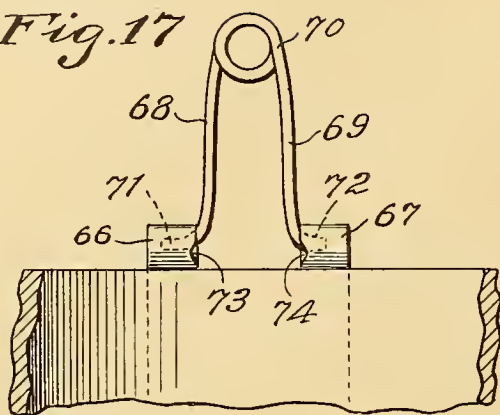


Fig. 18

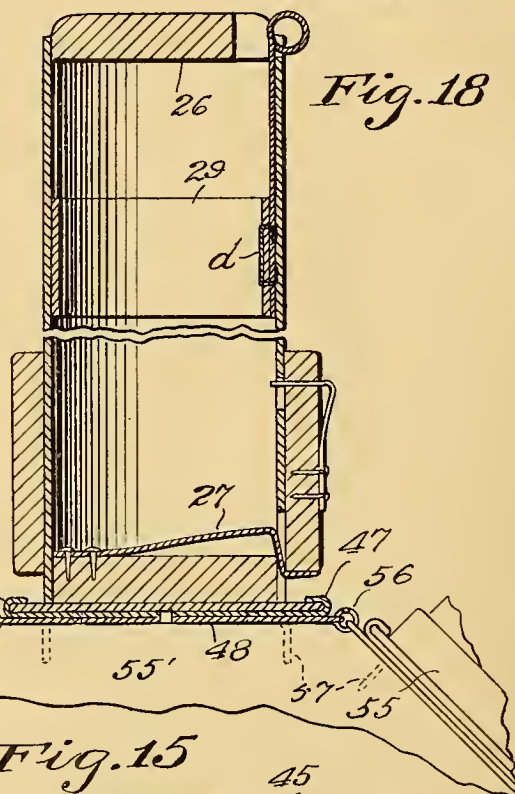


Fig. 16

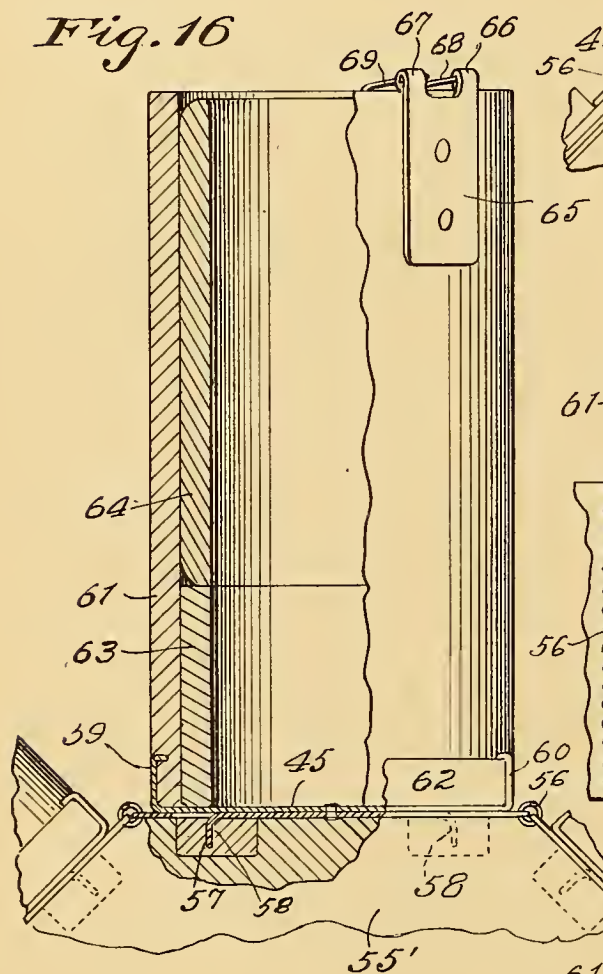
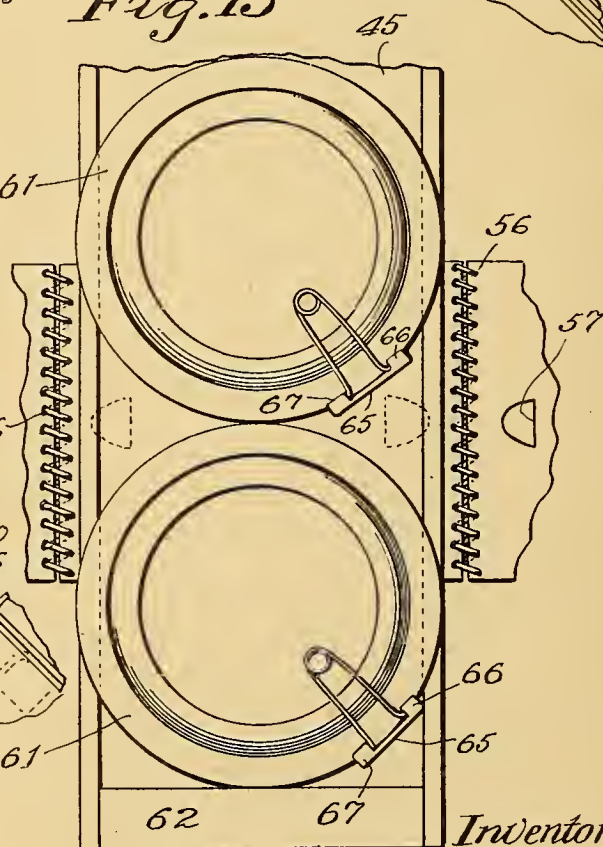


Fig. 15



Witnesses  
C. C. Holly  
S. G. Wells.

Inventor  
George B. Shaffer  
James R. Townsend  
his atty.



# UNITED STATES PATENT OFFICE.

GEORGE B. SHAFFER, OF LOS ANGELES, CALIFORNIA.

## CABINET FOR PHONOGRAPH-RECORDS.

1,100,401.

Specification of Letters Patent.

Patented June 16, 1914.

Application filed October 1, 1908. Serial No. 455,782.

*To all whom it may concern:*

Be it known that I, GEORGE B. SHAFFER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Cabinet for Phonograph-Records, of which the following is a specification.

An object of this invention is to provide means for conveniently and compactly storing phonograph-records, and to make said records readily accessible to the attendant.

In carrying out this invention further objects and advantages are attained, among which may be enumerated noiseless means for moving the records inside the cabinet to and from storing position, and to bring the records into position for removal by the attendant; spacing the records apart at the station where they are accessible to the attendant and holding them close together without liability of their being knocked against one another while they are in storing position, thus economizing space where required and giving freedom of movement to the attendant without liability of jamming or striking the records together in the operation of removing and replacing the same; holding the records stationary at all times desired; providing for convenient indexing and to provide means for holding the index convenient for inspection when the records are accessible; also to make provision for holding the phonograph conveniently near the place where the records are accessible, and to provide for storing horns and other appliances and other attachments for a phonograph.

Further objects and advantages may appear from the subjoined detailed description.

The invention may be variously constructed, and comprises a belt led over a roller and provided with means to hold the records so that the same project from the belt. This arrangement allows the records to stand close together except while above or below the roller, and at those places they will be caused to spread apart to stand radially relative to the roller at which they are. The belt-carrying rollers may be octagonal or otherwise provided with facets, or may be cylindrical. The forms illustrated are cylindrical and octagonal.

The accompanying drawings illustrate the

invention in a form at present deemed preferable.

Figure 1 is an elevation of a phonograph-cabinet embodying this invention. The parts are shown in position when the phonograph is not in use, and the records and the horn are stored out of the way of dust and danger of injury. The cabinet is viewed from the side on which the operator or attendant will stand while operating the phonograph. The cabinet-wall is broken to expose interior parts. Fig. 2 is a view from the left of Fig. 1, omitting the phonograph, and showing the record-chamber open to allow access to the records. The door of the cabinet is open, exposing the record-holders and records inside the cabinet. Parts are broken away to expose parts that would otherwise be hidden. Records are shown on all but three of the record-holders. Fig. 3 is a broken section on line  $x^3$ , Fig. 1. Fig. 4 is a detailed section on line  $x^4$ , Fig. 3, to show a record-holder and its support, and a record on the holder. Fig. 5 is a sectional detail of the same holder when the record is removed. Fig. 6 is a fragmentary detail of parts shown in dotted lines in the upper portion of Fig. 1, illustrating the brake for holding the record-belt stationary when required and allowing the same to be turned noiselessly and readily. Fig. 7 is a fragmentary detail plan and edge view to show means for connecting the ends of the record-belt. Fig. 8 is a fragmental, sectional detail of the tension device and roller for the record-belt. Fig. 9 is a fragmentary, sectional detail of a catch to hold the top section of the record-chamber in place, and to allow its removal when it is desired to gain access to the inside of the record-chamber. Fig. 10 is a plan illustrating the use of metallic slats. Fig. 11 is a vertical cross-section on line  $x^{11}$ , Fig. 10, and illustrating the use of short records on long holders. Fig. 12 is an end elevation of the parts shown in Fig. 10. Fig. 13 is a diagrammatic cross-section of the index. Fig. 14 is an enlarged sectional detail of the parts diagrammed in Fig. 13. Fig. 15 is a fragmental plan illustrating the use of metallic slats, metallic belts and internal record-holders. Fig. 16 is a fragmental elevation of the construction shown in Fig. 15, parts being shown in section to illustrate the use of a short record and a filler in a long record-



holder. Fig. 17 is an inside elevation of the catch for holding the records in place in the holder, the holder being broken away. Fig. 18 is a vertical sectional elevation analogous to Fig. 11 and showing flat metallic slats and metallic hinges, and operating upon an octagonal roller.

1 designates the main body of the case of the cabinet, square or rectangular in plan, and of any desired height.

2 designates a flat top for a part of the cabinet that forms a stand for the phonograph-case 3, and constituting, underneath said flat top, a receptacle in the form of a cupboard designed to store the phonograph-horn 4 stood on end. The other part of the cabinet is open at the top and is designed to receive and store phonograph-records 5, and is closed by a cap 6 that is preferably semi-cylindrical and is held in place by a snap 7.

8 is a shaft journaled in the ends of the cabinet coaxially with the cap, and carrying a roller 9 mounted in a horizontal position within the cabinet, and provided with a crank 10 to rotate the roller 9.

11 indicates a counter-shaft mounted loosely in slots 12 upon the inner faces of the ends of the cabinet in parallelism with the crank-shaft 8, and carrying a horizontal roller 13.

A belt 14 that may be of canvas or other suitable material, made in one or more, preferably two, bands, is carried by the rollers 9 and 13. The ends of each band of said belt are detachably connected together by hooks 15, 16, and a removable pin 17.

18 indicates retractile coil springs connected by eyes 19 at their upper ends with the ends of the shaft 11, and by turnbuckles 20, 21 at their lower ends with the bottom of the cabinet. The tension of said springs is exerted to stretch the belt and hold it tightly upon the rollers. Slat 22 are secured, as by rivets *a*, to the belt 14 in parallelism with each other and with the rollers. They may be arranged close together and may be sufficient in number to nearly cover the belt from end to end, leaving slight interspaces between the slats. In the case of cylindrical rollers the inner faces of the slats may be concaved so that the belt will pass smoothly around the rollers, and one or more phonograph record-holders *b* may be secured to each of the slats. This construction is of great importance for the reason that the belt 14 and consequently the record-holders *b* will always be automatically maintained in the same vertical alinement from roller 9 to roller 13 and under sufficient tension to keep the peripheries of the phonograph-records 5 in parallelism with one another. Each slat may have a cushion formed of a piece of felt 23 secured to the outer face of its slat

and extending from end to end thereof. Each of said holders may comprise a circular head 24 secured to the slat 22 upon, and of less diameter than the width of the felt so that the felt projects beyond the head to form a cushion upon which the record may come to rest; a cylinder 25 of cardboard or other material secured to the head; a second head 26 secured in the outer end of the cylinder; a record supporting and displacing spring 27 secured to the upper face of the inner head 24 and extending outwardly away from the belt to be pressed in toward the belt by the record and to return the record outward; and a spring-snap 28 secured to the inner face of the cylinder and extending upwardly and outwardly and provided at the outer end with a knob or roll *c* to hold the record in place; the free end of said spring 28 operating through a slot in the cylinder 25 and an opening in the head 26, and the free end of the spring 27 operating through a slot in the cylinder 25, and the outer end of the spring 28 being in the form of a knob, roll or hook *c* to hold the record in place while the tension of the spring 27 serves to press the record tightly against the knob *c* to prevent rattling. The spring 28 may be secured to the inner face of the cylinder by any suitable means as a staple *d* and a reinforcement 29, the latter being glued to the cylinder.

An opening *e* and a hinged lid 30 therefore provide access to the records through the cap 6. By turning the crank 10, any desired record may be brought into position to be removed through the opening. The outer faces of the slats between the rollers are parallel with the plane of the axes of the rollers, thus holding the holders and their records axially horizontal. As the belt revolves the slat-faces assume variant angles and thereby carry the record-holders and their records axially radial relative to the adjacent roller, so that the outer ends of the records are separated as shown in dotted lines in Fig. 1 and in solid lines in Fig. 6. The records may be marked for identification upon the heads 26 of the record-holders.

A lever 31 is secured to the inner face of the end of the cap 6 by a pivot 32, and is operated by a spring 33 to force toward the belt a bar 34 pivoted to the lever and provided at the ends with rollers 35 that engage opposed slat edges to yieldingly hold the slats at determined positions. Preferably the bar spans one slat and the rollers 35 are positioned such a distance apart that they will fit in spaces between the ends of the slats, as shown in Fig. 6, and to serve as brakes to hold the belt still and the holders steady when it is desired to remove or replace a record.



Disk-rollers 36 are mounted upon the inner faces of the ends of the cabinet in position to engage the outer faces of the ends of the slats, and cushioned rollers 37 are mounted upon levers 38 in opposition to rollers 36, there being retractile coil springs 39 to press the rollers 37 yieldingly against the slats opposite the rollers 36; thus constituting resilient automatic means to steady the load of records and prevent swaying or rattling.

From the foregoing it is now clear that the springs 18, rollers 37, levers 38 and springs 39 coöperate and constitute means acting to prevent lateral vibration of the belt 14 so as to hold the record-holders *b* substantially in true parallelism to one another so that said record-holders may be arranged very close together to economize space and so that there will be no danger of the records knocking against one another and thereby cracking and breaking them.

I wish to call special attention to the belt or belts, preferably two, mounted upon rollers and the record-holders carried by the belts, said holders being adapted to receive, hold and carry the records without injury, and also to the means of identifying the records.

Numbered indexes 40 are placed upon the inside of the lid in convenient position, and corresponding numbers, as *f*, are placed upon the record-holders.

When it is desired to remove a record, the lid 30 is opened, the handle 10 operated to bring the desired record into vertical position above the roller 9, the rows of records on each side of this row standing at tangents so as to allow easy access to the desired record. Then the handle *c* is pressed to retract the spring 28, the spring 27 presses the record outwardly, and the record is manually removed. As the roller 10 is operated, the tension of the springs 18 holds the belts straight and tight so that the records intermediate the rollers stand at substantially right angles to the belts.

For cheapness and convenience of manufacture the rollers may be made of wooden bodies with friction faces 41 formed of strips of canvas fastened around the rollers to prevent the belts from slipping.

The details of the index are shown in Figs. 13 and 14. Strips 41' are pasted to the back-board 42 suitable distances apart to form spacing-blocks, and the clamping-strips 43 are pasted to the strips 41' so as to form guides to receive the index-sheets 44 so that the sheets 44 may be removed, placed in a typewriter and have the desired names or numbers printed or written for identifying records; and when the records are changed these sheets may be removed and new sheets inserted or new names and numbers added to the old sheets.

In the construction shown in Figs. 10, 11 and 12, the metallic slats comprise the body portions 45 and the ways 46 and 47; said ways being formed by folding the edges of the slats upwardly and inwardly, and the body-portion being concavo-convex in cross-section to fit the curvature of the rollers. The holders are adapted for this form of metallic slat by attaching the blocks 24 to square projecting bases 25' so that the bases will slide into the ways 46 and 47. A clamping-plate 48 is placed against the lower face of the belt 49 and secured to the slat-body 45 by rivets 50. The cylinders 25 are secured to the blocks 24 as already described. A latch-opening 51 may be formed in each long cylinder 25, and a filler-cylinder 52 is provided with a catch 53, and said filler may be placed upon the cylinder 25 with the catch 53 engaging in the latch-opening 51 and then a short record 54 may be placed upon the holder. When a long record is to be placed upon the holder the filler 52 is removed. Blocks 55 are placed in the ends of the ways 46 and 47 at one end of each slat to close the ways and form a stop against which the bases 24 are pressed, and these blocks serve as a steadying means to receive the rollers 35 and hold the records steady.

In the construction shown in Fig. 18 the slats are flat to fit the faces of the octagonal roller 55', and the clamping-plates 48 are extended beyond the ways 46 and 47, and said clamping-plates are secured together by wire-lacing 56 to form a belt to fit the roller 55'. Teeth 57 are pressed downwardly from the plates 48 to engage in openings 58 in the roller 55' so as to avoid any tendency of the metallic belt to slip.

In the construction shown in Figs. 15, 16 and 17 the edges of the metallic slat 45 are turned upwardly a considerable distance and then over toward each other to produce enlarged ways 59 and 60, and the holders 61 are made to receive the records inside of the holders instead of outside; and the holders are notched on opposite sides to receive the inwardly-turned flanges of ways 59 and 60, there being blocks 62 at the ends of the ways. A filler 63 may be placed in the holder 61 and then a short record 64 may be placed in the holder. When long records are to be stored the filler 63 is removed or omitted. An attaching-plate 65 is secured to the outer face of the holder 61 at its upper end, and bearings 66 and 67 extend upwardly from the attaching-plate above the upper edge of the holder 61. A latch for holding the records in the holder is formed of spring-wire, and comprises the parallel arms 68 and 69, the coil 70 and the pintles 71 and 72. The latch is mounted with the pintles 71 and 72 in the bearings 66 and 67. Notches 73 and 74 are formed laterally at the inner sides of the bearings



66 and 67 so that when the latch is swung inwardly and down to a horizontal position the tension of the coil 70 will force the arms 68 and 69 into the notches 73 and 74 and hold the record 64 in the holder 61.

A large number of records may be carried in a comparatively small space, thoroughly indexed for immediate identification, and the device easily operated.

While I have shown some of the variations which may be made in the details of construction without departing from the spirit of my invention, it is obvious that numerous other changes might be made, and I do not wish to limit myself to any of the exact details shown and described.

I claim:

1. A cabinet for phonograph records comprising record-holders movably mounted, each record-holder consisting of a support to receive the record, a spring upon the outer end to hold the record, and a spring upon the inner end to press the record against the first spring.

2. In a cabinet for phonograph records, a belt mounted upon rollers, slats attached to the belt, phonograph record-holders secured to the slats, a bar yieldingly mounted upon the inner face of the ends of the cabinet, and rollers upon the bar to engage in the notches between the slats and yieldingly hold the slats in different positions.

3. In a cabinet for phonograph records, a belt mounted upon rollers, slats carried by the belt, phonograph record-holders carried by the slats, and rollers yieldingly mounted to engage the ends of the slats and steady the belt.

4. In a cabinet for phonograph records,

a case, rollers mounted in the case, a belt upon the rollers, slats carried by the belt, phonograph record-holders carried by the slats, steadying-rollers mounted upon the frame to engage the ends of the slats between the main rollers, levers pivotally mounted, springs for operating the levers, and steadying-rollers carried by the levers to yieldingly engage the slats in opposition to the first steadying-rollers.

5. In a cabinet for phonograph records, a phonograph record-holder comprising a support attached to a base, means for holding the record upon the support, ways for holding the base, and a belt for carrying the ways.

6. In a cabinet for phonograph records, a belt mounted upon rollers, metallic slats carried by the belt, ways carried by the slats, and phonograph record-holders mounted in the ways.

7. A cabinet for phonograph records, said cabinet comprising a case, rollers at the top and bottom of the case, an endless flexible belt extending from roller to roller, slats mounted on the belt in parallelism to and slightly spaced apart from one another along the belt, record-holders secured to the slats, and means acting to prevent lateral vibration of the belt so as to hold the record-holders substantially in true parallelism to one another.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 24th day of September, 1908.

GEO. B. SHAFFER.

In presence of—

JAMES R. TOWNSEND,

M. BEULAH TOWNSEND.



T. H. MACDONALD, DEC'D.

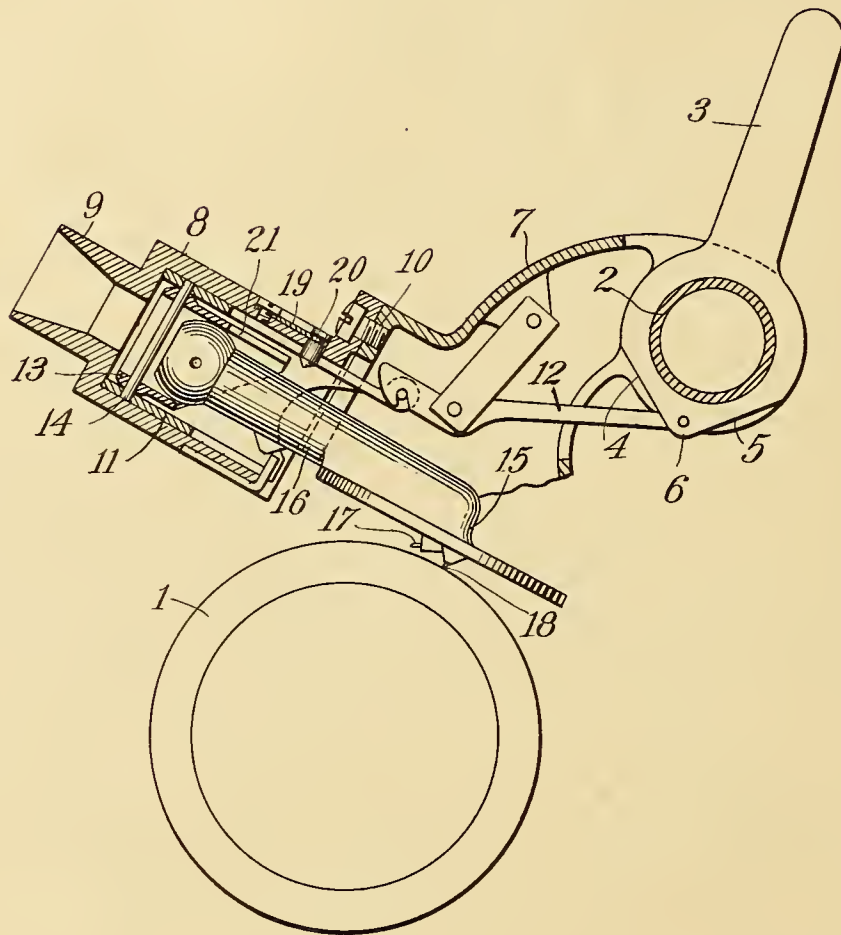
S. B. MACDONALD, EXECUTRIX.

DICTAPHONE.

APPLICATION FILED NOV. 4, 1912.

1,100,755.

Patented June 23, 1914.



Witnesses:  
Ruth C. Fitzhugh.  
E. E. Warfield.

Sophie B. Macdonald Inventor,  
Executrix of the Estate of Thomas H. Macdonald.  
By her Attorneys  
Mauro, Cameron, Lewis & Macaie



# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, DECEASED, LATE OF BRIDGEPORT, CONNECTICUT, BY SOPHIE B. MACDONALD, EXECUTRIX, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## DICTAPHONE.

1,100,755.

Specification of Letters Patent.

Patented June 23, 1914.

Application filed November 4, 1912. Serial No. 729,449.

*To all whom it may concern:*

Be it known that THOMAS H. MACDONALD, deceased, late of Bridgeport, Connecticut, has invented a new and useful Improvement in Dictaphones, which is fully set forth in the following specification.

This invention relates to graphophones or talking-machines, primarily the type intended for both recording and reproducing and commonly known as "dictaphones" or "commercial machines," which type employs a single diaphragm with two styli (one for recording and the other for reproducing).

Heretofore it has been supposed that a reproducer should bear upon the record-tablet with a pressure greater than that necessary or desirable in a recorder; therefore, with this end in view, various means have been provided whereby additional weight may be applied when the reproducing-stylus is in operative engagement with the record-groove, and removed when the recording-stylus is in operative relation with the record-tablet.

One feature of the present invention is the elimination of this additional weight or pressure.

Another feature is the provision of improved means for preventing lateral play during the recording-operation, while permitting lateral play during the reproducing-operation.

The invention consists of the construction and arrangement of the parts hereinafter set forth and claimed, and will be best understood by reference to the accompanying drawing, in which the figure is an end view, partly in vertical section, of a dictation graphophone equipped with a preferred embodiment of the present invention.

In the drawing, 1 indicates the cylindrical sound-record, or the blank cylinder, carried on the usual rotating mandrel.

2 is the usual carriage-sleeve surrounding the feed-screw, driven by the usual motor (not shown) which likewise serves to rotate the mandrel.

3 is the usual controlling-lever, having at its lower end the ring which encircles the sleeve 2 and has two cut-away portions 4 and 5 with the intermediate nose 6,—the parts 4—6—5 constituting the usual cam-

surface adapted to co-act with the partial feed-nut (not shown).

7 is the casing or frame of the "carriage," having at its rear the tubular extension 8 with the reduced nipple 9, which latter is adapted to carry the mouth-piece or listening-tube. This extension 8 is detachably secured to carriage 7, as by screw 10.

11 is a telescoping tube located in the extension 8; and 12 is a link connecting the forward end of this telescoping-tube 11 with the nose 6 on controlling-lever 3.

13 is a sleeve pivoted in the inner or rear end of telescoping-tube 11, by the transverse pivot 14 (located in a vertical plane), to permit lateral play of the sleeve.

15 is the usual "speaker" or "head," having the tubular neck 16, the rear of which latter is secured in the sleeve 13 upon an extended horizontal axis, so as to permit vertical play of the head 15. The diaphragm of head 15 carries the usual recording-stylus 17 and the usual reproducing-stylus 18 in the same vertical plane. The drawing shows the parts in the "reproducing" position, reproducing-stylus 18 being in operative engagement with the sound-record.

By the construction thus far set forth, it is seen that the head, with its two styli 17 and 18, is free to swing in a vertical plane, by reason of the horizontal pivoting of the neck 16; that it can swing laterally, by reason of the transverse play of the sleeve 13 upon its pivot 14; and that the two styli can be shifted transversely with respect to the cylindrical record or blank 1, by means of the longitudinal shifting of the telescoping-tube 11.

The foregoing is the old and well-known construction, illustrated, for example, in the Thomas H. Macdonald U. S. Letters-Patent No. 1,003,625, granted September 19, 1911, and the Haines Patent No. 1,042,110, granted October 22, 1912. But in such prior devices a pivoted weight is employed, with means for applying its pressure to the reproducing-stylus when the latter is in operation, and for removing the additional pressure when the recording-stylus is in operation. The dispensing with this additional weight, which is one of the main objects of the present invention, is based upon the dis-



covery that if, during the recording-operation, the recording-stylus be held absolutely locked against any lateral play whatever, so that the record-groove will not "stagger" from side to side, then there will be no appreciable tendency for the reproducing-stylus to "chatter" or to jump from one groove to the next; and that it is those tendencies which have necessitated the additional pressure upon the reproducing-stylus. Preferred means for this locking, as embodied in the particular structure set forth, involves in the first place that the neck 16 be pivoted within the sleeve 13 in such manner that the former can swing on its pivot in a single (vertical) plane only, without any lost motion or looseness of play (as, for instance, by means of the well-known expedient of oppositely-disposed cone-point bearings, suitably adjusted in the sleeve 13 to engage conical seats in the rear end of the neck 16. And, in the second place, in order to lock both sleeve and speaker against lateral play, the preferred embodiment comprises a spring-pressed member carried by one of the parts (as the stationary casing 8) and co-acting with a corresponding guide-groove carried by the other member (as the telescoping-tube 11). More specifically, along the top of extension 8 is secured the flat spring 19, preferably counter-sunk to lie flush with, or below the surface of, the extension 8; and from the free end of this spring depends a plunger 20, which passes freely through a suitable opening in the wall of extension 8, and also through a longitudinal slot in telescoping-tube 11,—the lower end or tip of this plunger being tapered as shown. Along the upper side of sleeve 13 is a longitudinal groove or slot 21, having flared side-walls, adapted to engage snugly the tapered tip of plunger 20. The length of sleeve 13 and its slot 21, and the relative location of plunger 20, are such that in the "reproducing" position (shown in the drawing) the plunger does not engage the slot, and the sleeve 13 (with the speaker and its reproducing-stylus 18) is capable of lateral play; but when the parts have been drawn forward, by handle 3 and link 12, into the "recording" position (where recording-stylus 17 engages the cylinder 1), then the longitudinal slot 21 of the sleeve 13 engages snugly with plunger 20 and is thereby locked against lateral play. Preferably the adjustment is such that the flaring side-walls of this slot 21 slightly lift plunger 20 against the tension of spring 19, so that the latter serves to hold the parts securely in close engagement, and thereby the sleeve (with the speaker) is firmly held locked against any lateral play whatever.

The advantages of the present invention are more fully realized by the employment of styli of smaller diameter than heretofore

customary, because, within limits, the smaller the diameter of the recording-stylus, the deeper the record-groove (and the less the tendency of the recording-stylus to stagger from side to side), and because the reproducing-stylus (which is customarily of smaller diameter than the recording-stylus) is less liable to skip out of the deeper groove, and therefore will more faithfully track the proper course. For example, in the present construction, excellent results have been attained, both in recording and in reproducing, by the employment of a recording-stylus having a diameter of about eighteen one-thousandths (0.018) of an inch, and a reproducing-stylus of somewhat less diameter.

It is to be understood that the invention is not limited to the precise constructions and arrangements above set forth, as they can be varied considerably without losing the benefit of the novel improvements herein disclosed. For example, it is not essential (although it is preferable) that the styli be of the small dimensions indicated; the spring-pressed plunger or its equivalent might be located in one of the telescoping parts, with the guide-groove in the stationary casing; or the guide-groove might be located in the neck or other part of the speaker, instead of in the sleeve 13, in which case precision of the pivoting of the neck within the sleeve may be dispensed with; and other transpositions of parts or other changes of construction and arrangement of details may be employed, without in any case departing from the spirit of the invention.

Having thus described the invention, the following is claimed:

1. In a talking-machine, a member having lateral as well as vertical play and carrying a diaphragm provided with a recording-stylus and a reproducing-stylus, means for shifting said member rectilinearly to bring either stylus into operative position to the exclusion of the other, a stud, and a groove caused to engage therewith by the shifting into position of said recording-stylus, whereby the latter is locked against lateral play.

2. In a graphophone, the combination of a telescoping-member, means for drawing the same in and out, a longitudinally-slotted sleeve pivoted in said member to swing laterally, a speaker pivoted in said sleeve to swing vertically and having a recording-stylus and a reproducing-stylus, and a spring-pressed plunger co-acting with the slot aforesaid to lock said speaker against lateral play during the recording-operation.

3. In a graphophone, the combination of a telescoping-member, means for drawing the same in and out, a longitudinally-slotted sleeve pivoted therein to swing laterally, a speaker pivoted in said sleeve to swing ver-

5 tically and having a recording-stylus and a reproducing-stylus, and a stud adapted to be engaged by the slot aforesaid to lock said speaker against lateral play during the recording-operation.

10 4. In a recorder-reproducer for graphophones, the combination with a collar pivoted to swing laterally, a head pivoted to swing vertically in said collar and having a diaphragm carrying a recording-stylus and a reproducing-stylus, and means for shifting either stylus into operative position without change of pressure, of a spring-

pressed plunger adapted to co-act with a groove in said collar to lock said collar and head against lateral play when recording. 15

In testimony whereof I, as said executrix, have signed this specification in the presence of two subscribing witnesses.

SOPHIE B. MACDONALD,

*Executrix of the estate of Thomas H. MacDonald, deceased.*

Witnesses:

J. S. GRIFFITH,

L. S. EASTMAN.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."





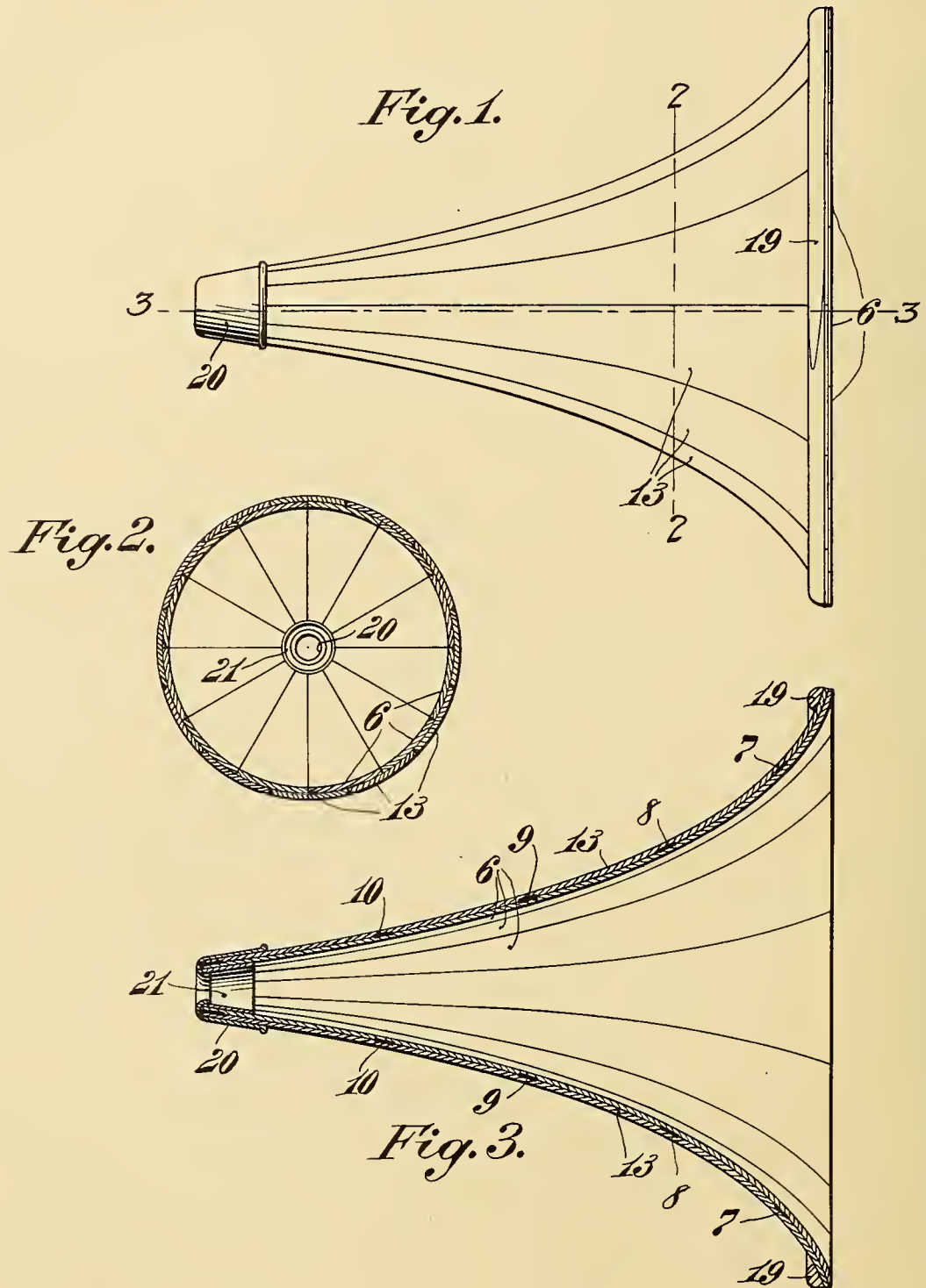


A. G. SOISTMANN.  
 PHONOGRAPH HORN.  
 APPLICATION FILED FEB. 1, 1910.

1,100,849.

Patented June 23, 1914.

2 SHEETS—SHEET 1.



Witnesses:  
 Jas. C. Holmsmith  
 Mae Hofmann

Inventor:  
 Adolph G. Soistmann,  
 By *McLeod*,  
 Attorneys.

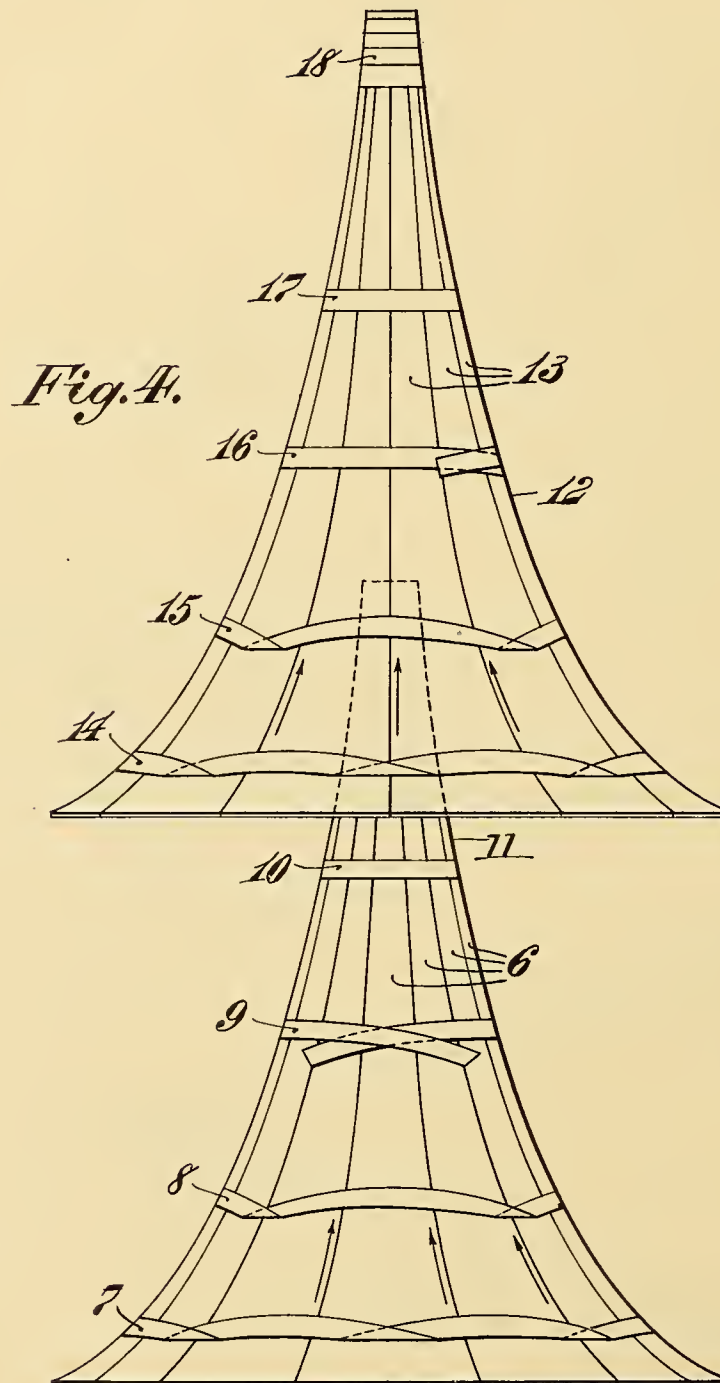




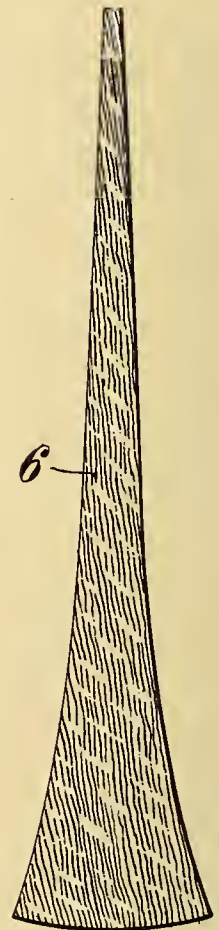
1,100,849.

Patented June 23, 1914.

2 SHEETS—SHEET 2.



*Fig. 5.*



Witnesses:  
 Jas. C. Woburnsmith  
 Mae Hofmann

Inventor:  
 Adolph G. Soistmann,  
 By J. H. Wood, Jr.  
 Attorneys

# UNITED STATES PATENT OFFICE.

ADOLPH G. SOISTMANN, OF CAMDEN, NEW JERSEY.

## PHONOGRAPH-HORN.

1,100,849.

Specification of Letters Patent.

Patented June 23, 1914.

Application filed February 1, 1910. Serial No. 541,223.

*To all whom it may concern:*

Be it known that I, ADOLPH G. SOISTMANN, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented a new and useful Phonograph-Horn, of which the following is a specification.

My invention relates to improvements in phonograph horns and method of making same.

The object of my invention is to provide a horn of wood or other fibrous material having a flaring or bell-shaped mouth. The object is to produce a horn which shall be extremely light in weight and which shall be so constructed as to maintain its shape and so that its component parts shall be held firmly together without being affected undesirably either by changes in temperature or other atmospheric conditions and also to produce a horn which shall have satisfactory acoustic properties. It seems to be well recognized in the art that the wooden horn is the most satisfactory horn for phonograph purposes both from acoustic considerations and also for considerations of appearance where different kinds of wood may be used to match other parts of the machine. It has also been found that the flaring or bell-mouthed formation is the shape of the horn which is now universally demanded, and consequently which must be supplied by successful manufacturers and dealers.

The flaring horn, made of tapered strips, requires that each tapered strip be bent in one direction to secure the circular cross-section of the horn, while a large part of its longitudinal extension must be bent in the transverse direction to secure the flare of the horn. This double or transverse bending of a normally flat piece of wood sets up internal stress in each strip of wood, tending to cause said strips to return to their normal flat condition. This tendency, if not counteracted, would result in a separation of the strips forming a horn of the bell or flaring shape.

The wooden horn which has had the most extended success up to the present time, is made of a plurality of horn shaped layers, each layer composed of separate composite strips of cross-grained veneer, and the flare is made by separating the strips at the flar-

ing end of the horn and inserting filling pieces. I have found however that a much less expensive horn can be made in which the component parts will afford sufficient reinforcement to each other to overcome the internal stress, above referred to, to maintain the structure in good condition, and without employing separate composite strips of cross-grained veneer, and without employing filling pieces between the separated strips at the flaring end of the horn.

The accompanying drawings illustrate an example of a successful embodiment of my invention.

Referring to these drawings:—Figure 1 is a side elevation of my horn. Fig. 2 is a cross-section on line 2—2 of Fig. 1 with the rim 19 omitted. Fig. 3 is a longitudinal section on line 3—3 of Fig. 1. Fig. 4 is an elevation of the two cooperating horn shaped shells, one adapted to superimpose the other, the view showing one shell partly inserted within the other. Fig. 5 is an elevation of a tapered strip.

Similar numerals refer to similar parts throughout the several views.

In constructing my horn, I provide a number of suitably shaped tapered strips 6, for example of a single layer of veneer or very thin wood. A number of these I assemble on a properly shaped form, being the shape desired for the interior of the horn. The strips obviously are so shaped that the longitudinal edges of each strip will make close contact with each neighboring strip throughout the extension of their longitudinal edges. These strips are secured to the form by brads or other suitable means, and are then bound together wrapping around the same, the reinforcing or retaining bands, such as 7, 8, 9 and 10, of tape or any suitable fabric, glued thereto. The strips of wood being so thin that each strip can readily be made to take the shape of the form upon which it is placed, namely the double transverse bend, to secure the circular cross-section as well as the flaring or bell-shaped formation of the horn. In this way is formed the inner shell 11. Upon another form, of slightly greater dimensions, namely of a dimension which will form a shell 12, having its interior dimensions approximately corresponding to the outer di-



mensions of shell 11, I assemble the suitably shaped tapered strips 13 also, for example, of a single layer of veneer or very thin wood. These strips 13 are secured to the  
 5 form in a similar manner by brads or other suitable means and are then bound together by the encircling retaining or reinforcing tapes or bands such as 14, 15, 16, 17 and 18, and securely glued thereto. When the two  
 10 shells 11 and 12 are thus formed the entire outer surface of shell 11 and the entire inner surface of shell 12 are coated in with glue or other suitable adhesive material, and the two shells brought together, 12 fitting  
 15 over 11, and 11 fitting within 12. The joints between strips 13 breaking with the joints between strips 6.

As a preferred construction it will be noted that each tapered strip is so cut from  
 20 the sheet of wood veneer, that the grain of the wood will run substantially parallel with one of its longitudinal edges, and will thus be at an angle with the other longitudinal edge toward its wider end, as indicated  
 25 in Fig. 5, and also by the arrows in Fig. 4. I so arrange the several tapered strips of each layer, that the straight grain portion of the tapered strips of one layer will lie against and coöperate with that portion of  
 30 the tapered strips of the other layer having the grain running at an angle with its adjacent longitudinal edge. Thus what would otherwise be the weaker portion of each tapered strip, is reinforced by a straight  
 35 grain portion of another strip, and it follows that throughout that part of the extension of each strip which is subjected to the double transverse bending, the grain of the strips of one layer cross the grain of the  
 40 strips of the other layer thus adding substantially to the stability of the entire structure. The structure thus formed is then placed upon a suitable clamping and drying  
 45 form which will press all the parts of the structure into the desired shape of the flaring or bell-mouthed horn. Heat is applied and the pressure is sufficient to cause the glue to seek all apertures and cracks between the several parts. After which a contin-  
 50 uation of dry heat causes the drying and setting of the glue, whereupon the structure becomes one of great strength, very light in weight and having resonant qualities of a high order. A ring or rim 19 may be glued  
 55 to the outer rim or margin of the horn to add still further to its strength and also to its appearance.

This horn being symmetrical in cross-section, may be placed upon a lathe and the  
 60 temporary retaining or reinforcing bands 14, 15, 16, 17 and 18 on the outer shell may be removed, and the whole outer surface and inner surface of the horn are given a high polish. It will be understood that the

bands, such as 7, 8, 9 and 10, on the inner  
 65 shell 11, being covered by the superimposing shell 12, remain as additional reinforcing means between said shells, and undoubtedly exert considerable reinforcing power, and  
 70 being pressed firmly between the shells, by the pressure exerted thereon in the gluing operation, the several elements partake largely of the nature of an integral structure so far as tone qualities are concerned.

A metallic thimble or tapered sleeve, com-  
 75 posed of the outer member 20 and the inner member 21, suitably spun together, adds further to the strength of the horn at its smaller end, and affords means for securing the same to the phonograph.  
 80

It will be understood that my invention is not to be confined to the specific embodiment above described as a preferred form or  
 as an example. My claims are intended to  
 85 include all reasonable equivalents, and are not to be construed to have limitations not absolutely necessary or specifically recited.

It will be understood that other fibrous material may be used in lieu of wood with-  
 90 out departing from the spirit of my invention, and also that the tapes or reinforcing bands may run either in a circular direction around the horn or may consist of separated  
 95 strips running longitudinally or in any other desired direction, at different points on the horn. The essence of this feature being that strips of tape or similar material are secured at different points over adjacent  
 100 edges of the strips that is, over the points between adjacent strips, to contribute in holding said adjacent edges together, and  
 105 also that these several strips being glued on both sides when placed intermediate the two shells will be firmly glued to both shells and serve to reinforce the several strips of all the shells, thereby reinforcing the entire structure.

What I claim is:—

1. A symmetrical flaring or bell shaped  
 110 horn of circular cross-section, composed of a plurality of shells one secured within another, each shell composed of tapered strips of veneer bent both in longitudinal and transverse directions and arranged to break joints with the strips of the adjacent shell, each  
 115 strip having a gradual taper through the greater part of its extension with curved flaring margins at its larger end and each strip of a layer contacting throughout the extent of both its longitudinal edges with  
 120 adjacent strips.

2. A symmetrical flaring or bell shaped  
 horn of circular cross-section, composed of  
 125 a plurality of shells one secured within another, each shell composed of tapered strips of veneer, the grain of the wood of the strips of one shell crossing the grain of the wood of the strips of an adjacent shell at their

larger ends, the said strips being bent both in longitudinal and transverse directions and arranged to break joints with the strips of the adjacent shell, each strip having a  
5 gradual taper through the greater part of its extension with curved flaring margins at its larger end and each strip of a layer

contacting throughout the extent of both its longitudinal edges with adjacent strips.

ADOLPH G. SOISTMANN.

Witnesses:

HOWARD S. O'KIER,  
MAE HOFMANN.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."







T. H. PRICE & H. R. WHEELDON.

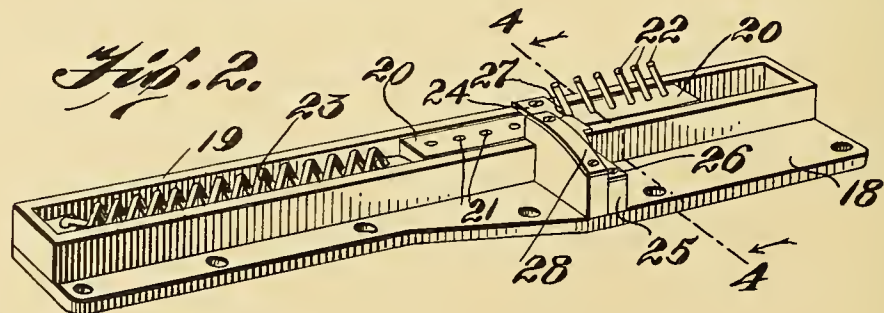
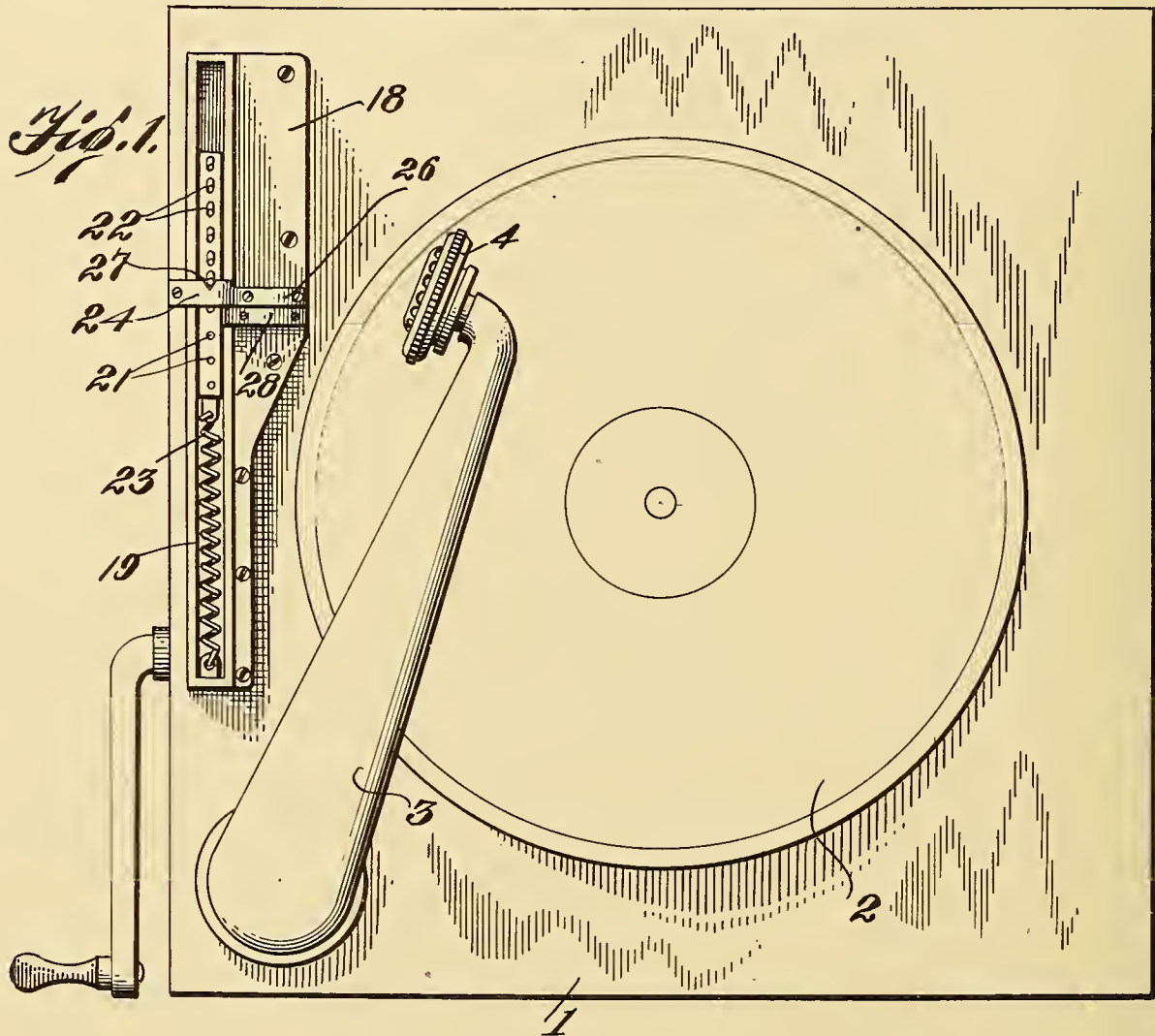
NEEDLE CHANGING DEVICE.

APPLICATION FILED APR. 29, 1913.

1,100,910.

Patented June 23, 1914.

2 SHEETS—SHEET 1.



WITNESSES:

*H. K. Vrooman.*

*Irving L. McCathron*

INVENTOR

*Thomas H. Price*

*H. R. Wheeldon*

BY

*H. K. Vrooman* ATTORNEY  
THEY





T. H. PRICE & H. R. WHEELDON.

NEEDLE CHANGING DEVICE.

APPLICATION FILED APR. 29, 1913.

1,100,910.

Patented June 23, 1914.

2 SHEETS-SHEET 2.

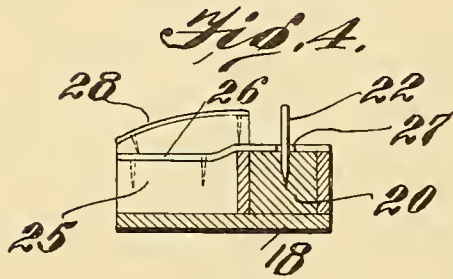
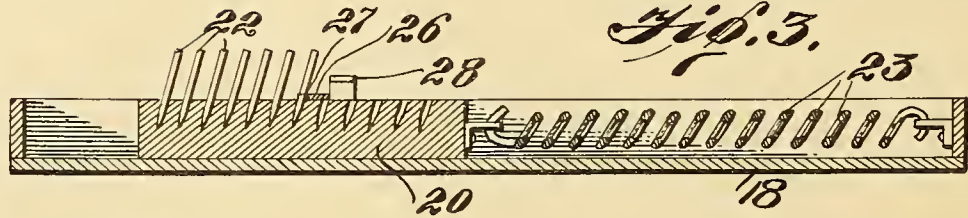


Fig. 5.

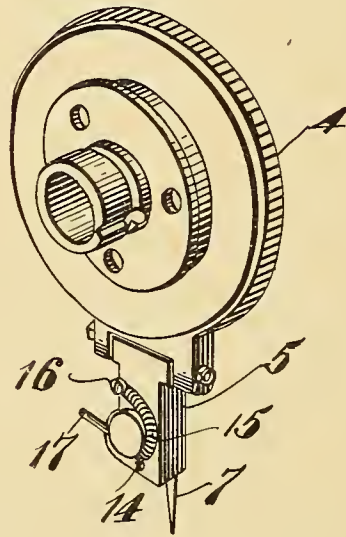


Fig. 6.

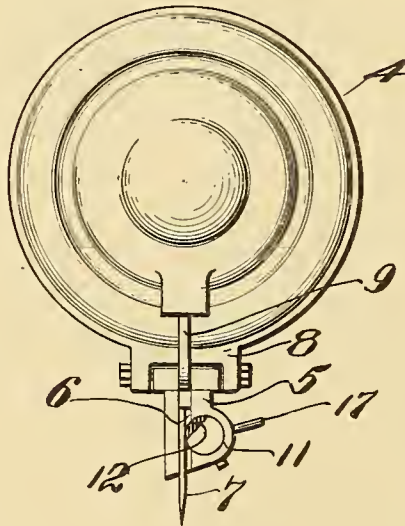


Fig. 7.

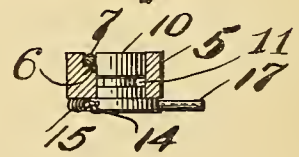
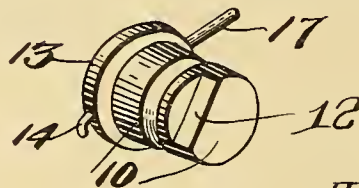


Fig. 8.



WITNESSES:

H. B. Vrooman.

Inv. L. O. McEnithan

INVENTOR

Thomas H. Price  
H. R. Wheeldon

BY

E. C. Vrooman  
their ATTORNEY

# UNITED STATES PATENT OFFICE.

THOMAS H. PRICE AND HARRY R. WHEELDON, OF LAKE CHARLES, LOUISIANA.

## NEEDLE-CHANGING DEVICE.

1,100,910.

Specification of Letters Patent.

Patented June 23, 1914.

Application filed April 29, 1913. Serial No. 764,425.

*To all whom it may concern:*

Be it known that we, THOMAS H. PRICE and HARRY R. WHEELDON, citizens of the United States of America, residing at Lake Charles, in the parish of Calcasieu and State of Louisiana, have invented certain new and useful Improvements in Needle-Changing Devices, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to needle changing devices for graphophones and has for its object the production of an efficient automatic means whereby the needle may be automatically removed from the reproducer and another needle automatically replaced therefor.

Another object of this invention is the production of a needle magazine which may be attached to any desired machine for the purpose of supplying needles to the reproducer.

With these and other objects in view, this invention consists of certain novel constructions, combinations and arrangements of parts, as will be hereinafter fully described and claimed.

This invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a top plan view of the graphophone showing the device applied thereto. Fig. 2 is a perspective view of the magazine applied to the graphophone. Fig. 3 is a longitudinal section of the magazine. Fig. 4 is a transverse section taken on line 4—4 of Fig. 2. Fig. 5 is a detail perspective of the needle carrying portion of the reproducer. Fig. 6 is a side view of the opposite side of the needle carrying portion of the reproducer. Fig. 7 is a transverse section taken through the needle engaging portion. Fig. 8 is a detail perspective of the needle-retaining or engaging cam.

By referring to the accompanying drawings, it will be seen that 1 designates the graphophone which carries the usual disk 2, and the tone arm 3 is employed in the usual manner and carries the reproducer 4 at its rear end. This reproducer 4 carries a needle carrying frame 5 which needle carrying frame 5 is provided with a vertically extending notch 6 in which fits the needle 7. The needle carrying member 5 is pivotally mounted between the downwardly extending ears 8 of the reproducer and is connected to the diaphragm of the

reproducer by means of the usual arm 9. A needle gripping cam 10 is rotatably mounted within the needle carrying body 5 and this cam fits in a pocket 11 formed in the body 5 as is illustrated clearly in Fig. 6. The cam 10 is provided with a flat portion 12 for facilitating the placing of the needle within the notch 6 and the corner of the cam is adapted to firmly grip the needle as indicated clearly in Fig. 6 for holding the needle in engagement with the needle carrying body or frame 5. The opposite end of the cam 10 is provided with an enlarged head 13 and this enlarged head 13 is provided with a depending hook 14 which engages one end of the spring 15, the opposite end of the spring being connected to the body 5 by means of a pin, screw, or other suitable fastening means 16. The spring 15 is so connected to the cam 10 as to normally hold the same in engagement with the pin 7 to prevent the pin from accidentally falling out of the body or holder 5. The head 13 is provided with a rearwardly extending releasing arm 17, which releasing arm is adapted to be swung when brought in contact with the magazine to be hereinafter described, whereby the needle contained within the needle carrying body 5 may be dropped from the needle containing or carrying body 5.

A needle carrying reservoir 18 is positioned upon the body 1 and to one side of the graphophone disk record 2 as is illustrated in Fig. 1, and is so positioned as to allow the reproducer to pass over the needle releasing portion of the magazine when the tone arm is removed from the record by swinging the same to the left. This magazine comprises an elongated body having a channel portion 19 extending along one edge thereof, and within this channel portion 19 is positioned an operating plunger 20, which plunger is provided with a plurality of perforations 21 in which are adapted to be carried the needles 22. A coil spring 23 is connected to the forward end of the plunger 20, and this spring is also connected to the opposite end of the channel 19 so as to normally exert a pulling pressure upon the plunger 20 and keep the forward pin at all times in engagement with the stop bridge 24, as illustrated clearly in Fig. 2.

The magazine 18 is provided centrally thereof with a bridge portion 25 upon which



is mounted a track 26 and this track 26 is provided with a notched portion 27 adapted to receive the needles 22 for the reproducer. These needles 22 are placed on an incline in the plunger 20 so as to be in proper position to be taken by the needle supporting head or frame 5. The lower end of the needle supporting head 5 passes or travels upon the track 26 and as the reproducer is swung toward the magazine so as to allow the lower end of the needle carrying frame or body 5 to operate upon the track 26, the releasing finger 17 of the cam 10 will ride up the cam-shaped track 28, said track 28 being in a higher plane than track 26 and terminating at the channel 19. As the finger 17 travels up track 28, said finger will rotate against the tension of spring 15, thereby causing cam 10 to rotate and release the needle. As the reproducer continues its movement toward the magazine, the slot 6 is brought into position to receive a new needle, and simultaneously the finger 17 passes the higher end of track 28, whereupon the spring 15 acts upon said finger and causes the cam 10 to rotate to a position that causes the said cam to clamp the new needle in the slot 6. The reproducer is then raised to withdraw the needle from the plunger 20 and returned to operative position on the disk 2.

From the foregoing description, it will be seen that a simple device has been produced for automatically releasing the needles from the reproducer and refilling the same with needles, and it should be understood that when the needles are released from the needle carrying body, the same will drop down to one side of the channel portion 19 and the needle carrying portion will be ready to remove another needle from the plunger 20. It, of course, should be understood that the device may be varied in its minor details of mechanical construction without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new, is:—

1. In a graphophone attachment of the class described the combination with a needle carrying member of a reproducer provided with a vertically extending groove, a cam rotatably mounted within said member and provided with a flat portion, said cam adapted to engage a needle for detach-

ably holding the same within said groove, a spring for holding said cam in firm engagement with a needle, a rearwardly extending finger secured to said cam, a reservoir, a plunger slidably mounted within said reservoir, a stop plate secured to said reservoir, a plurality of needles carried by said plunger, means for pulling said plunger into a forward position, and a cam member carried by said reservoir and adapted to engage said rearwardly extending finger for releasing a needle from said needle carrying member of said reproducer, said plunger being adapted to hold said needles in the path of movement of said needle carrying member of said reproducer for supplying needles to said needle carrying member of said reproducer after a needle has been discharged therefrom.

2. A reservoir for supplying needles to a reproducer comprising a body provided with a longitudinally extending channel, a needle-carrying plunger slidably mounted within said channel, a spring secured to one end of said plunger and adapted to hold the same in an operative position within said channel, a stop plate secured to said channel member and overhanging said plunger, and an inclined wall secured to said reservoir and positioned to one side of said channel, said inclined wall being adapted to engage the needle releasing portion of a reproducer for releasing a needle therefrom.

3. A reservoir for supplying needles to a reproducer comprising a body provided with a track-way, a needle carrying plunger slidably mounted upon said track-way, tension means secured to said plunger for holding the same in an operative position upon said track-way, a stop means secured to said track-way and overhanging said plunger, and an inclined wall secured to said reservoir and positioned to one side of said track-way, said inclined wall being adapted to engage the needle releasing portion of said reproducer for releasing a needle therefrom.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

THOMAS H. PRICE.

HARRY R. WHEELDON.

Witnesses:

THOS. H. O'BRYAN,

D. M. FOSTER, Jr.





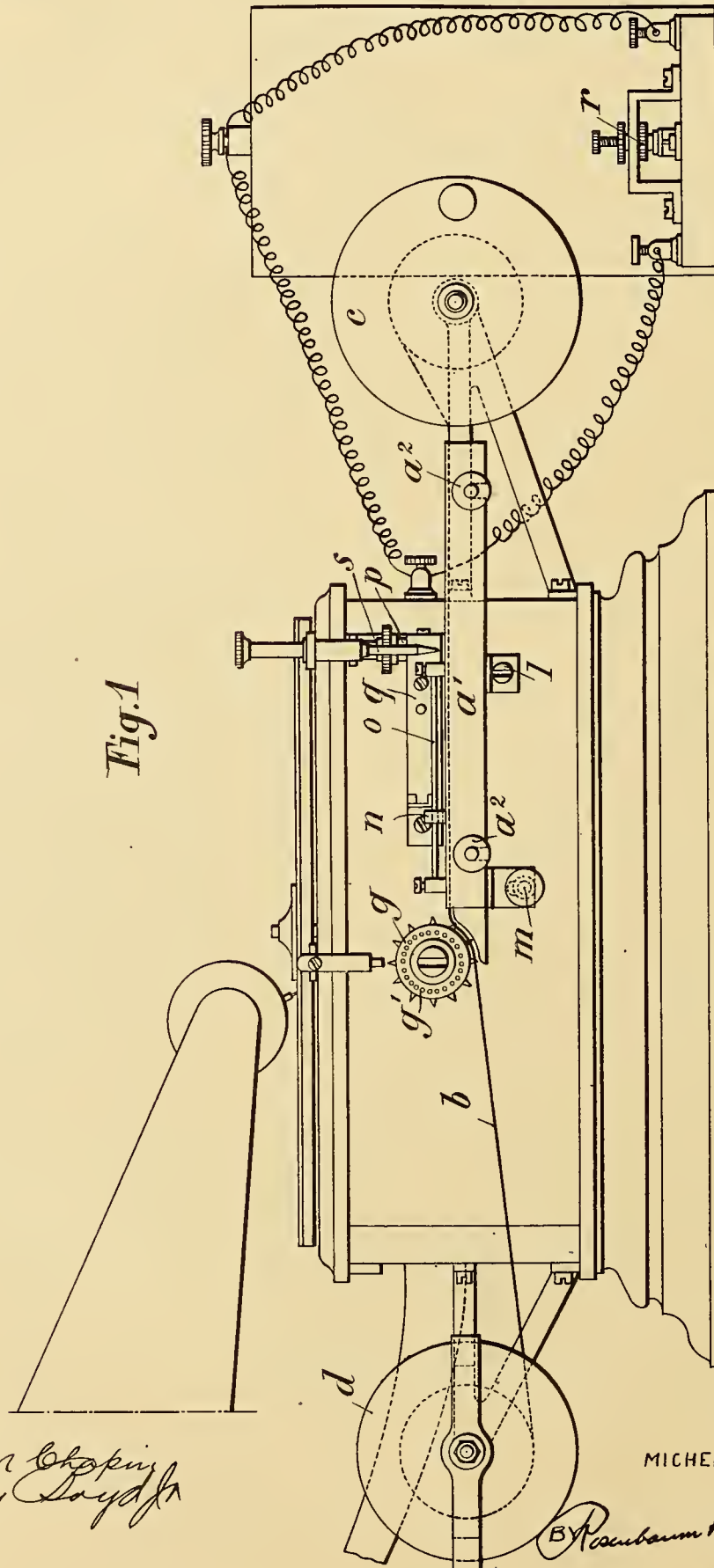
M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
 APPLICATION FILED JUNE 15, 1909.

1,101,326.

Patented June 23, 1914.

7 SHEETS—SHEET 1.

Fig. 1



WITNESSES:

*Waldo M. Chapin*  
*Charles Lloyd*

INVENTOR:  
 MICHEL de PEZZER

BY *Rosenbaum & Stockbridge*  
 ATTORNEYS





M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
 APPLICATION FILED JUNE 15, 1909.

1,101,326.

Patented June 23, 1914.

7 SHEETS—SHEET 2.

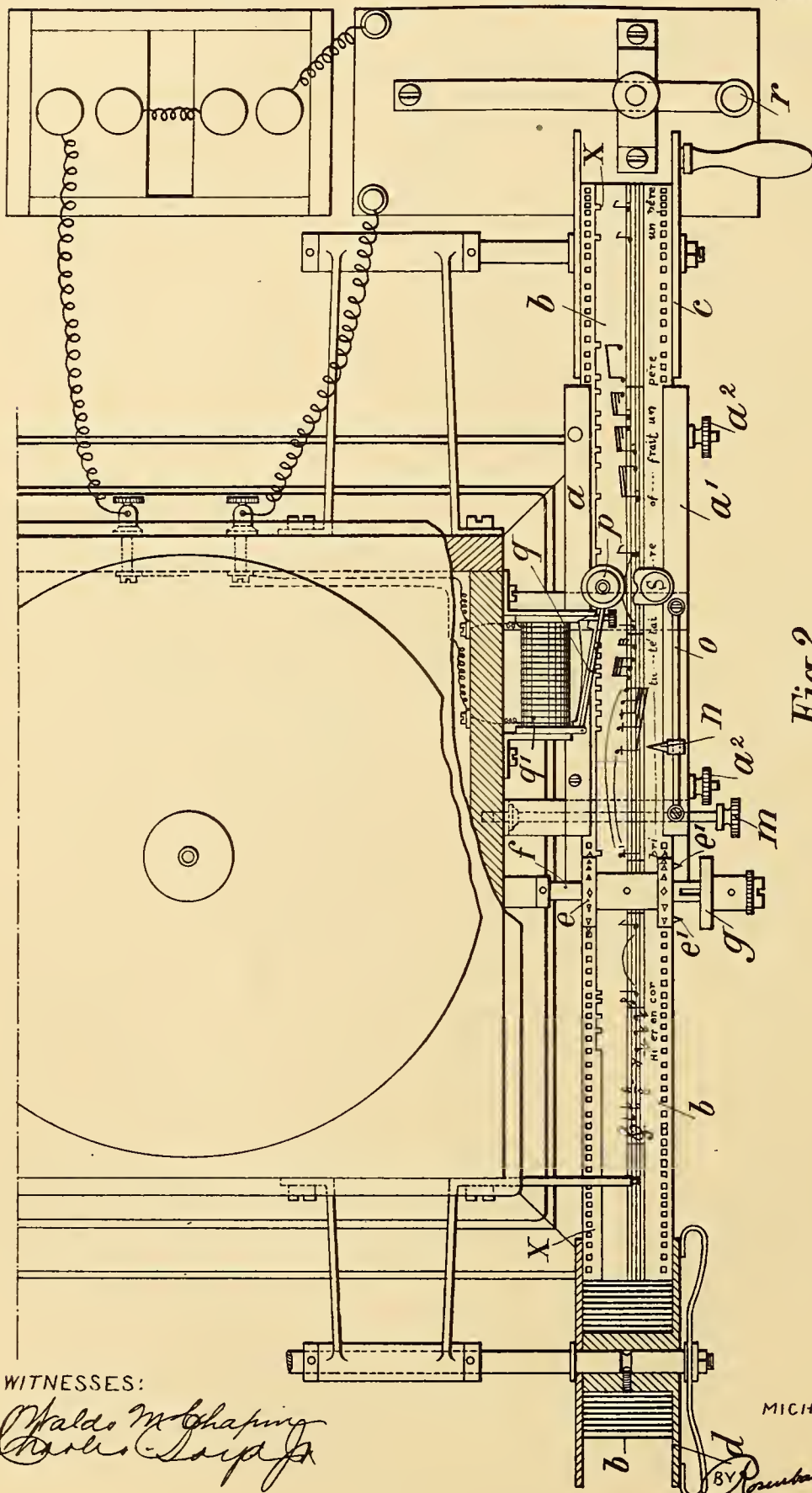


Fig. 2

WITNESSES:

*Waldo M. Channing*  
*Charles L. Lipp*

INVENTOR  
 MICHEL de PEZZER

BY *Robertson & Starkind*  
 ATTORNEYS

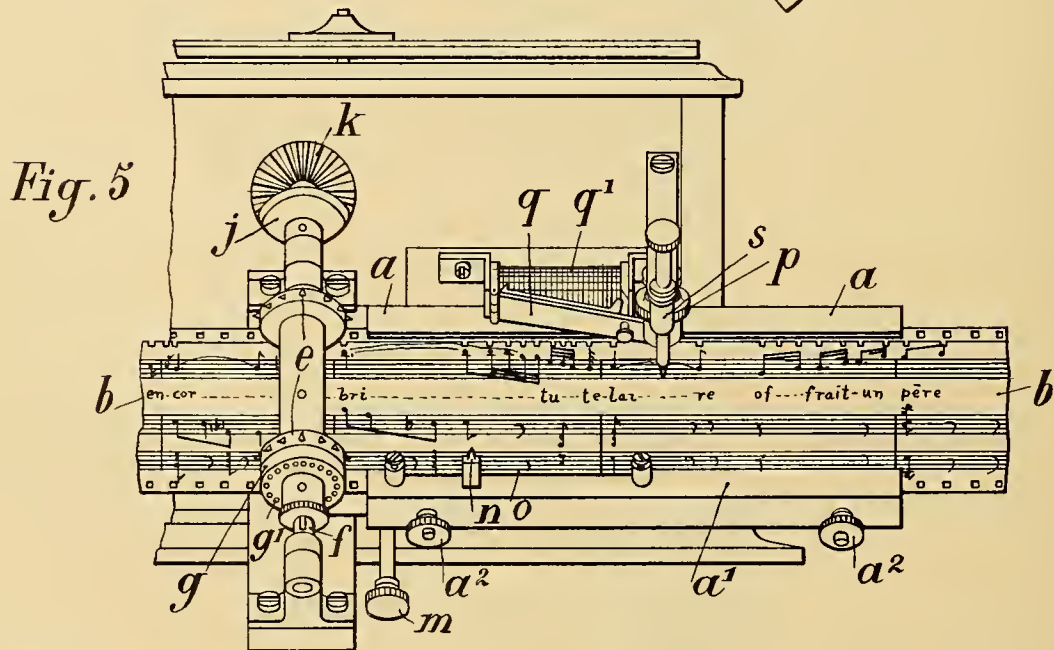
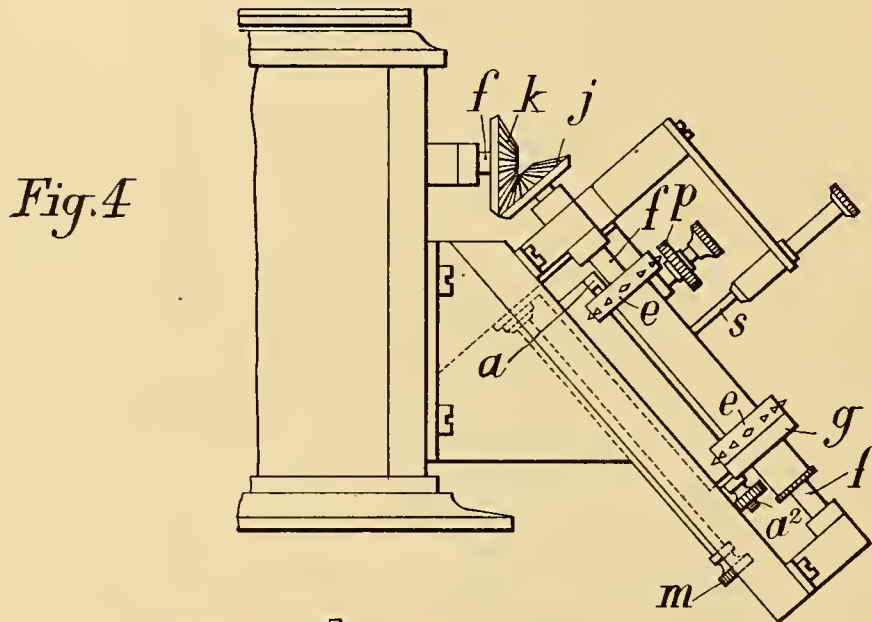
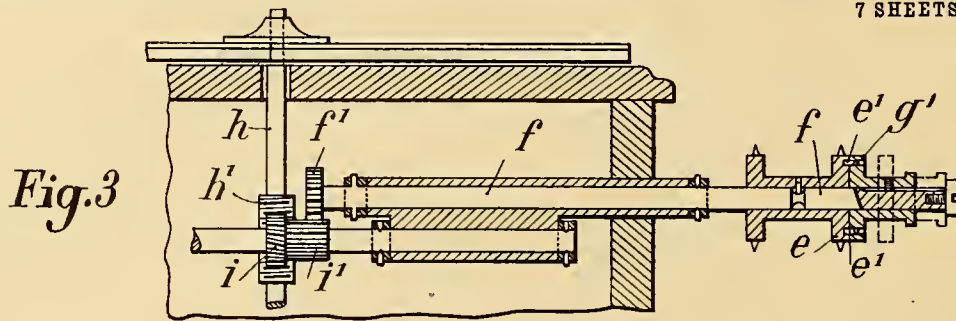


M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
 APPLICATION FILED JUNE 15, 1909.

1,101,326.

Patented June 23, 1914.

7 SHEETS—SHEET 3.



WITNESSES:

*Waldo M. Chapin*  
*Charles D. Boyd*

INVENTOR:  
 MICHEL de PEZZER.

BY *Rosenbaum & Stockbridge*  
 ATTORNEYS.





M. DE PEZZER.  
INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
APPLICATION FILED JUNE 15, 1909.

1,101,326.

Patented June 23, 1914.

7 SHEETS—SHEET 4.

Fig. 6

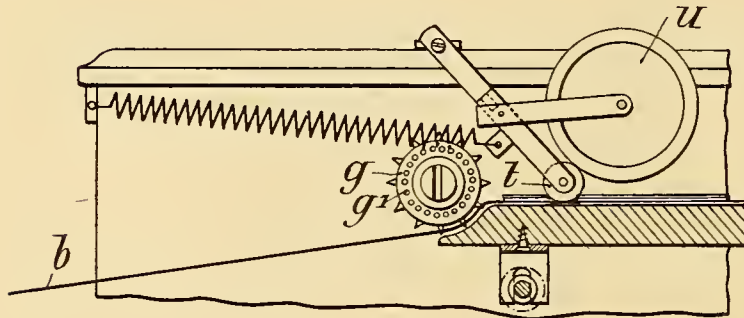


Fig. 8

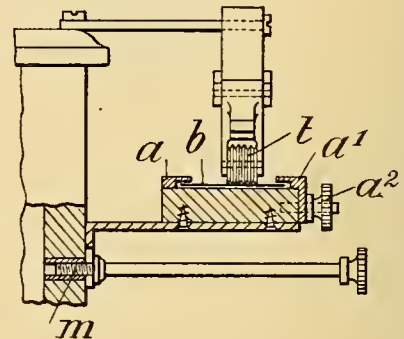


Fig. 7

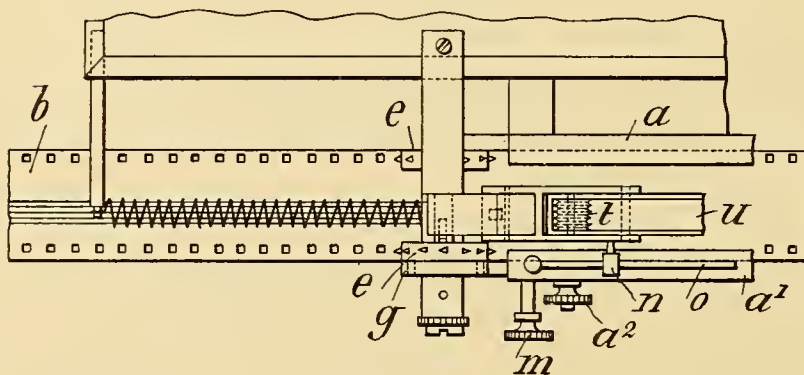


Fig. 9



WITNESSES:

Maldo M. Chapin  
Charles. Lloyd Jr.

INVENTOR:  
MICHEL de PEZZER

BY Rosenbaum & Stark  
ATTORNEYS.



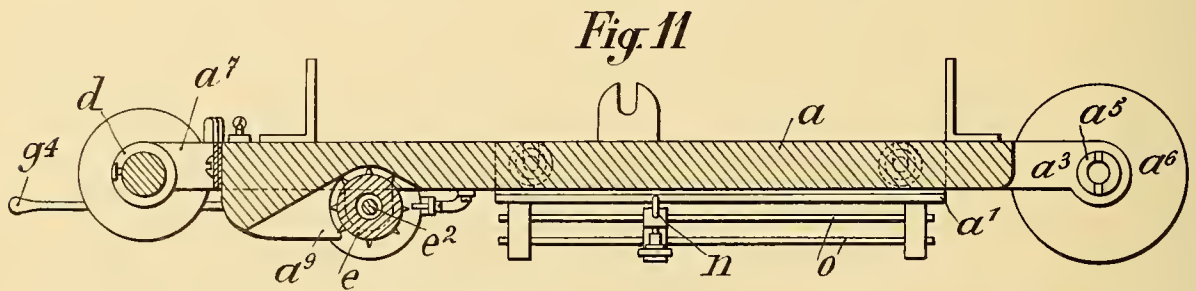
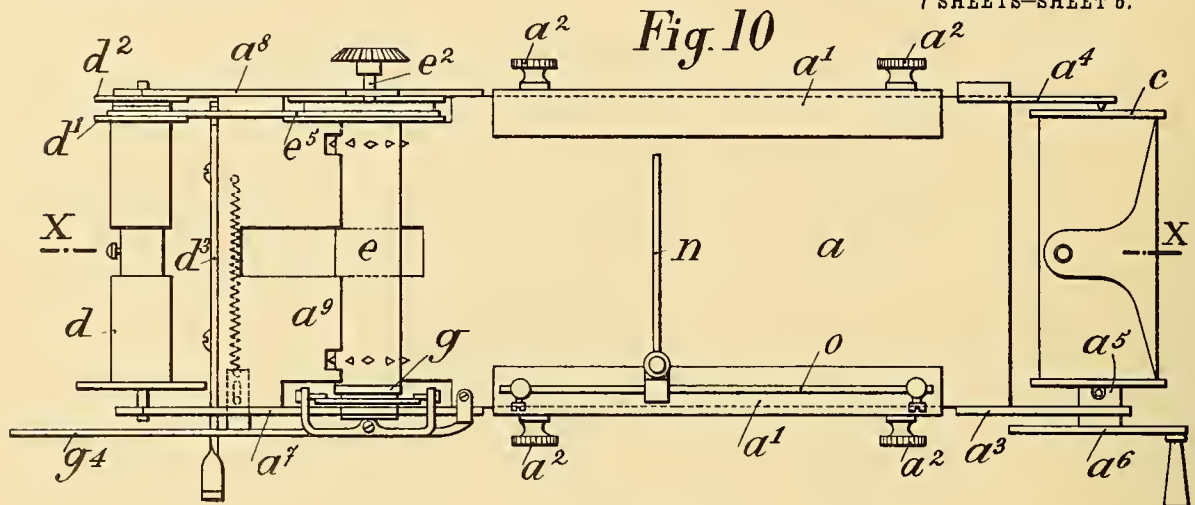


M. DE PEZZER.  
INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
APPLICATION FILED JUNE 15, 1909.

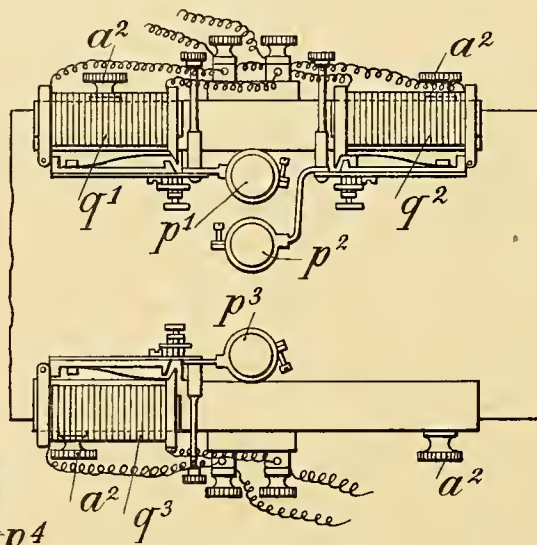
1,101,326.

Patented June 23, 1914.

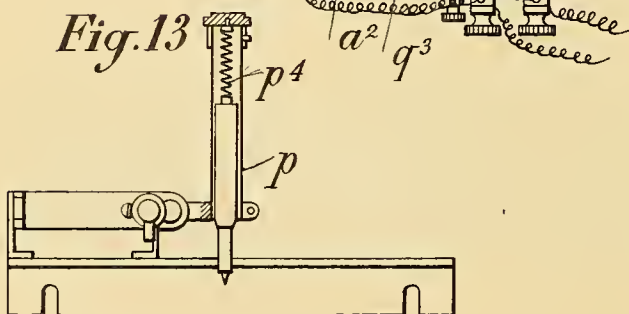
7 SHEETS—SHEET 6.



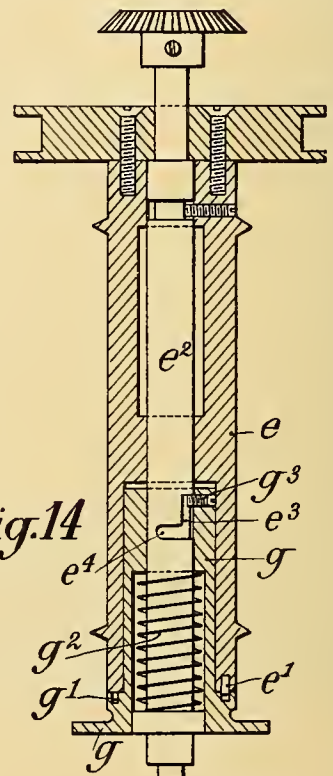
*Fig. 12*



*Fig. 13*



*Fig. 14*



WITNESSES:

*Waldo M. Chapin*  
*Charles Lloyd Jr.*

INVENTOR:

MICHEL de PEZZER.

BY *Reuben & Stockbridge*  
ATTORNEYS



M. DE PEZZER.

INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.

APPLICATION FILED JUNE 15, 1909.

1,101,326.

Patented June 23, 1914.

7 SHEETS—SHEET 6.

Fig. 16

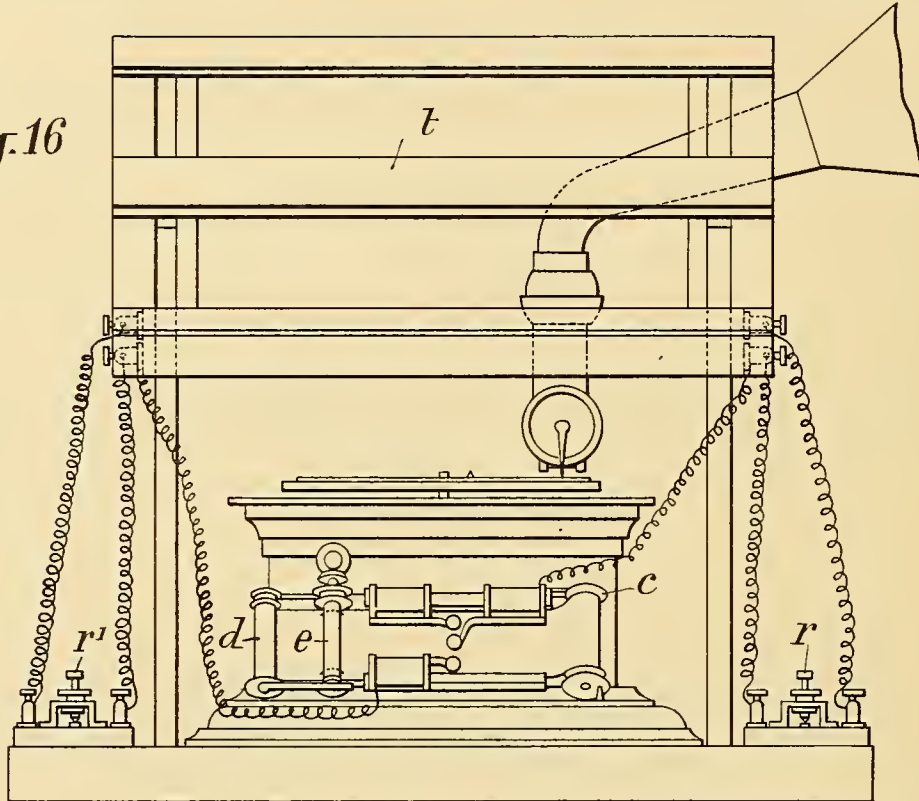
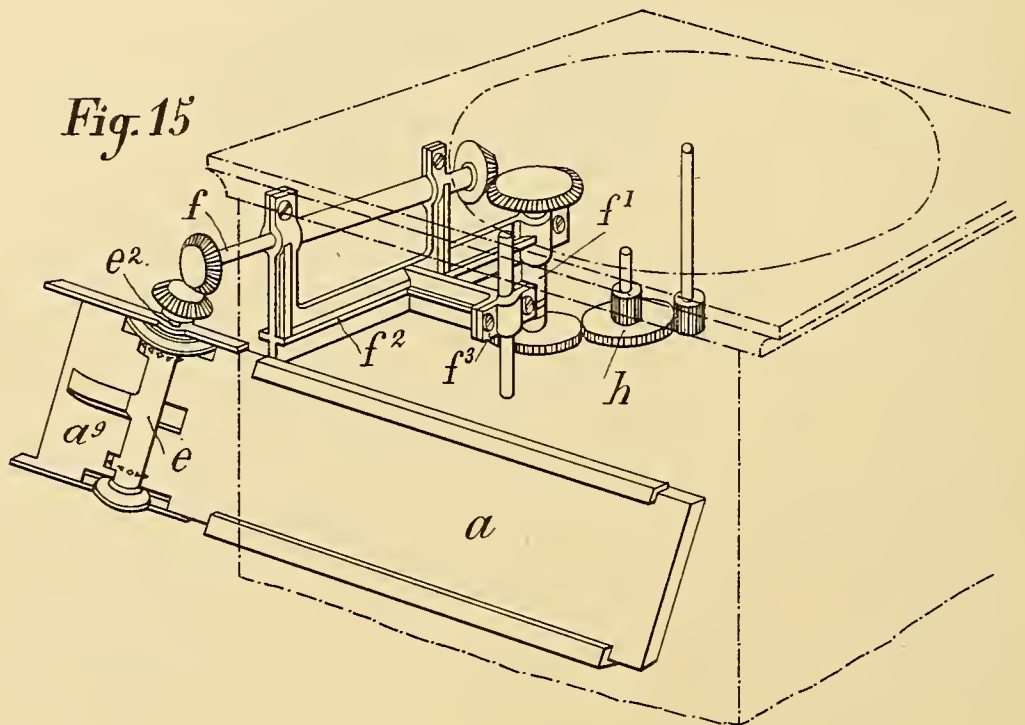


Fig. 15



WITNESSES:

*Waldo M. Chapin*  
*Charles D. J. Jr.*

INVENTOR:

MICHEL de PEZZER

*B. Rosenbaum & Stockbridge*  
ATTORNEYS.





M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
 APPLICATION FILED JUNE 15, 1909.

1,101,326.

Patented June 23, 1914.

7 SHEETS—SHEET 7.

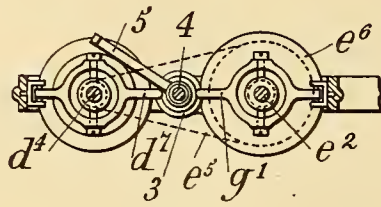


Fig. 19

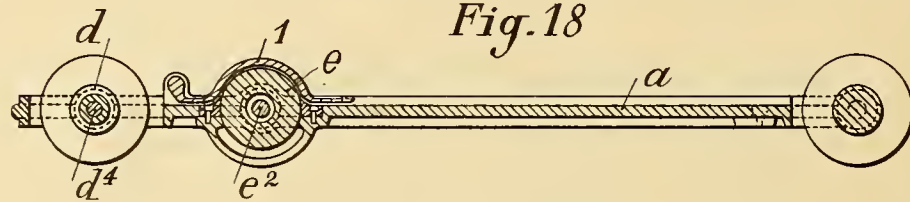


Fig. 18

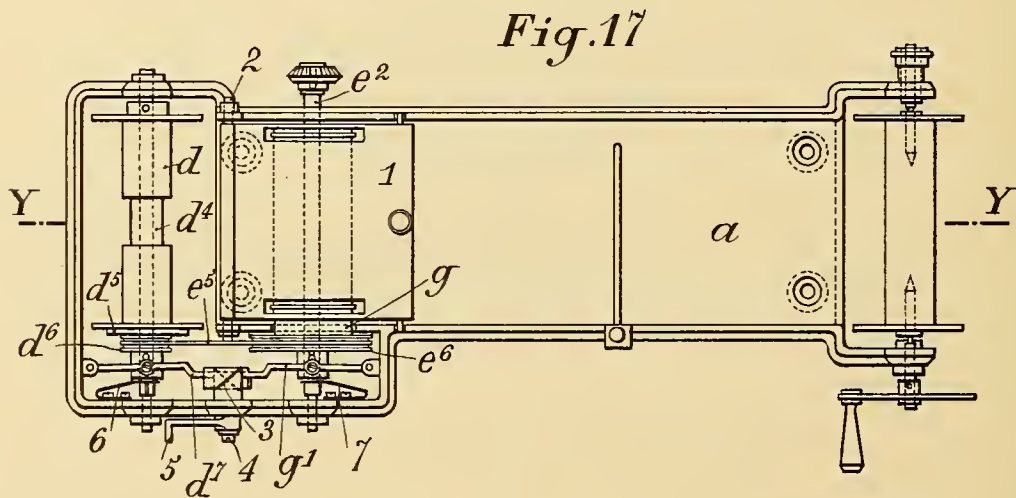


Fig. 17

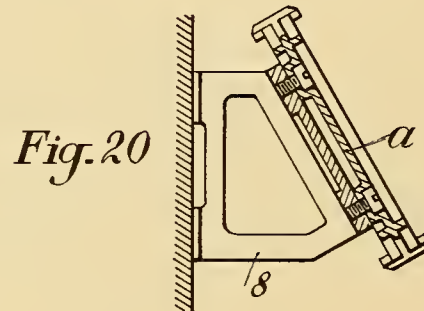


Fig. 20

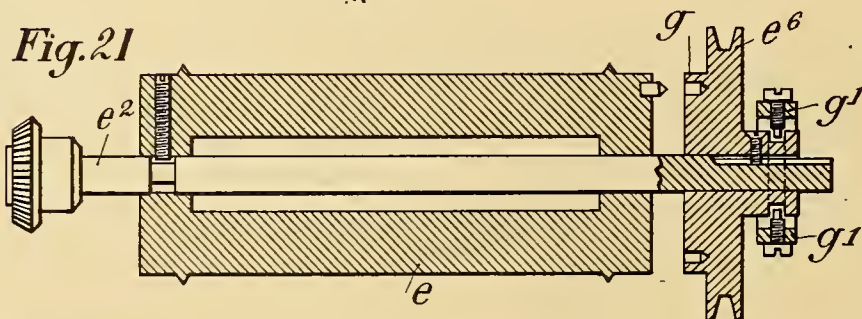


Fig. 21

WITNESSES:

*Wm M Chapin*  
*Charles Dwyer*

INVENTOR:  
 MICHEL de PEZZER,

BY *Paulum & Stocking*  
 ATTORNEYS.

# UNITED STATES PATENT OFFICE.

MICHEL DE PEZZER, OF PARIS, FRANCE.

INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.

1,101,326.

Specification of Letters Patent.

Patented June 23, 1914.

Application filed June 15, 1909. Serial No. 502,274.

*To all whom it may concern:*

Be it known that I, MICHEL DE PEZZER, a citizen of the French Republic, residing at Paris, in the Department of the Seine, France, have invented certain new and useful Improvements in Indicating Devices for Phonography and Their Application, of which the following is a specification.

This invention refers to an indicating arrangement which permits of following by reading the ordinary emissions of a phonograph simultaneously with the production of the said sounds.

With this object in view, the essential element of the indicating device consists of a flexible band unwound by clock-work and inscribed with the various parts of the piece to be performed, for example, the song, the words and the accompaniment. On this band the music or the words are not written as is usual with scores, that is to say, that instead of the space existing between the various bars depending on the number of signs to be arranged between the said bars, this inscription solely depends on the period of time occupied in executing the sounds or syllables inclosed between two consecutive bars. In other words, when the band is unwound, the various musical signs, or the various syllables of the words, pass (before a fixed pointer, for example) exactly according to the various alterations of speed imparted to the whole according to the expression it is desired to impart. It can consequently be understood that by following the unwinding of the indicating band, the performers, for example, the singer and the accompanist, are guided in the execution of their respective parts, so as to be always together, and any hesitancy or inaccuracy in the execution is thereby avoided. Whatever the case may be, the indicating band will generally comprise one or more lines referring to the melodious part or to the declamatory part, and one or more other lines referring to the accompaniment. In order practically to carry out the special rhythmic and expressive inscription referred to above, and at the same time to obtain agreement between the various parts, for the production of the band, it will be necessary to employ an arrangement for inscribing the rhythm, which arrangement is described farther on. The indicator, formed in the manner just described, is capable of various applications, either alone or in combination

with other musical apparatus, more particularly the phonograph. In this latter case, by separately recording the song and the accompaniment, it permits the singer being accompanied by the phonograph, or, an accompanist to accompany a song by the phonograph.

I shall now describe my invention with reference to the accompanying drawings, showing the musical indicator referred to above as applied to a gramophone, and provided with the special arrangement for the production of the rhythmic bands of the indicator.

Figure 1 is an elevation of the whole arrangement. Fig. 2 is a corresponding plan view. Fig. 3 is a detail showing the actuating mechanism of the rhythmic band. Figs. 4 and 5 respectively show a side and front view of a modification. Figs. 6 to 8 show a front, plan and side view of the application of an arrangement for inscribing staves. Fig. 9 shows a portion of a rhythmic band. Fig. 10 shows a modification of the arrangement of the desk. Fig. 11 is a longitudinal section on the line X—X of Fig. 10. Fig. 12 shows a portion of this desk with inscribing styles. Fig. 13 is a detailed view showing one of these styles. Fig. 14 is a detailed view, on a larger scale, showing a longitudinal section of the actuating roller of the desk shown in Fig. 10. Fig. 15 is a perspective view of the mechanism actuating this roller. Fig. 16 is an elevation showing this desk fitted to a phonograph and provided with its electrical actuating mechanism. Figs. 17 to 21 show another modification of the desk, in which Fig. 17 is a plan view, Fig. 18 a longitudinal section on Y—Y of Fig. 17, Fig. 19 an elevation showing the mechanism for actuating the engaging and disengaging gear, Fig. 20 showing a cross section of the desk as fitted to the phonograph, and Fig. 21 is a detail showing on a larger scale a longitudinal section of the actuating roller.

The arrangement shown in Figs. 1 to 3 comprises a guide (a) in which is passed the rhythmic indicating band (b); one of the sides (a') of this guide is movable so as to permit of rapidly inserting and removing the band (b); this movable side (a') is held in position on the guide (a) by milled screws (a<sup>2</sup>) (Figs. 1, 2 and 8). The band (b) is unrolled from a stock reel (c) on to a receiving reel (d). This unrolling movement



of the band (*b*) is controlled by a double pin-wheel (*e*) fitted loose to a shaft (*f*) which is rotated and at the desired moment rotates the pin-wheel (*e*) by the intermediation of a coupling disk (*g*). This disk (*g*) can slide along the shaft (*f*) but is always carried around on the rotation of the latter. The inner surface of the disk (*g*) is provided with slots or recesses (*g'*), which are for the purpose of meshing with projections (*e'*) provided on the adjacent surface of the pin-wheel (*e*) (Figs. 2 and 3).

The shaft (*f*) is rotated by clock-work or in any other suitable manner. For the case in which the indicating band is fitted to a phonographic apparatus, as in the example shown in the drawings, the shaft (*f*) would be rotated by the driving shaft (*h*) of the phonograph, by the intermediation of any suitable transmission whatever; for example, the shaft (*h*) may be provided with a worm (*h'*) meshing with a worm-wheel (*i*), fixed to a pinion (*i'*) which latter meshes with a cog-wheel (*f'*) keyed to the shaft (*f*).

In order to facilitate the reading of the band, more especially when the latter is inscribed with the song and the accompaniment, the guide (*a*) may be inclined at a variable angle, as shown in Figs. 4 and 5; in this case the shaft would consist of two parts, connected together by beveled pinions (*j*, *k*).

In order to be able to easily disengage the indicating band (*b*) from the pin-wheel (*e*), the guide (*a*) can be turned slightly around the fixing screw (*l*), and is held in position at its other extremity by a set screw (*m*). The receiving reel (*d*) has imparted to it a rotary movement which can be controlled either by the pin-wheel (*e*) or by the clock-work of the apparatus. The side (*a'*) of the guide (*a*) is provided with a pointer (*n*) movable along a rod (*o*) so as to be brought in front of the desired spot of the indicating band. In order to produce this band, it is first necessary to inscribe the rhythm of the piece; with this object in view, the band actuated as has been described, is unwound, and by means of a style on the emission of each note or each syllable, a line is traced on this band and is prolonged during the whole period through which this note or syllable is sustained. This succession of lines, some long others short, constitutes a graphic indication of the rhythm of the piece.

In front of the starting point of each line, the corresponding notes or syllables are inscribed on the band, and beneath the same the corresponding notes of the accompaniment. For inscribing this graphic record the present arrangement may consist of a style (*p*), fitted to the armature (*q*) of an electro-magnet (*q'*) in the circuit of which a manip-

ulator (*r*) is arranged. When the current is cut off from the electro-magnet (*q'*), the style (*p*) will be in its position of rest and will then inscribe on the band a straight line X—X. On each emission of notes or syllables the lever of the manipulator (*r*) will be pressed down, thereby closing the circuit of the electro-magnet (*q'*), the armature (*q*) of which will be attracted and the style (*p*) will first trace a small line approximately perpendicular to the line X—X; during the whole period during which the note or syllable is sustained the manipulator (*r*) is kept pressed down, and the style (*p*) will then trace on the band a line parallel to the line X—X, and the length of which will depend on the period of time that this note or syllable is sustained.

The tracing point of the style (*p*) may be mounted on an arrangement which permits of removing the band of paper whenever no line should be inscribed on the band.

Another auxiliary style (*s*) mounted on a spring and intended to be operated directly by hand, may be arranged in front of the style (*p*). This second style (*s*) may be utilized as a substitute for the style (*p*), or for marking on the band certain reference lines intended for example, in the case in which an error has been committed in recording the graphic record by means of the first style actuated electrically, to permit of immediately finding on the band the place where the error has been made. The rhythmic graphic record thus inscribed on the band may be preserved after the inscription of the music and words, or it may be rubbed out. The present apparatus will be provided or not with the arrangement for inscribing the rhythm, according to the purpose to which the apparatus is to be applied.

The apparatus for producing the band may furthermore consist of one or more printing disks (*t*), inked by roller (*u*) (Figs 6 to 8) and intended for the purpose of tracing the musical staff or staves on the band (*b*), while the latter is being rotated, and this is effected simultaneously with the inscription of the rhythmic graphic record.

By means of the present arrangement of control as applied to a phonograph, and as described above, it is possible to execute one of the parts of a piece by the phonograph and the other portion can be executed by the person with absolute agreement of the two parts. For example, the band (*b*) formed as shown in Fig. 9, and passing along in front of the pointer (*n*) permits an accompanist (pianist or the like) to follow the song performed by the phonograph, inasmuch as the accompanist is always forewarned by the inscriptions of the band (*b*) in front of the pointer (*n*) of the exact moment in which the notes or syllables forming the song will be emitted by the phono-



graph. The present indicating arrangement also permits of a singer being accompanied by a phonograph.

In the modification shown in Figs. 10 and 11, the apparatus assumes the form of a desk, and consists of a board (*a*) mounted at an angle on a support fitted to one of the sides of the box of the phonograph. Two guides (*a'*) are fitted to the longitudinal edges of this board by means of set screws (*a<sup>2</sup>*) and serve to guide the band (*b*) on which is inscribed, or on which has to be inscribed, the rhythmic graphic record and the signs or indications corresponding to the sounds emitted by the phonograph. The part (*a*) is provided at one of its extremities with two lugs (*a<sup>3</sup>*, *a<sup>4</sup>*) between which is engaged the stock wheel (*c*); the spindle (*a<sup>5</sup>*) of a crank disk (*a<sup>6</sup>*) turns freely in one of these lugs (*a<sup>3</sup>*); a slot is provided in this spindle and engages with a pin or projection provided on one of the sides of the reel (*c*). The other side of the latter is provided in its center with a small recess in which can engage a point arranged on the end of the lug (*a<sup>4</sup>*); this latter is elastic so as to permit of an easy and rapid insertion and removal of the reel (*c*). At its other end the part (*a*) is provided with two other lugs (*a<sup>7</sup>*, *a<sup>8</sup>*), between which are mounted the pin-wheel (*e*) and the receiving wheel (*d*); in order to increase the contact surface of the band with the pin-wheel (*e*) a boss (*a<sup>9</sup>*) is formed at the back end of the part (*a*). The pin-wheel (*e*) is mounted loose on a shaft (*e<sup>2</sup>*) (Fig. 14) mechanically connected to the clock-work of the phonograph as described farther on, and is connected up to this shaft by coupling disk (*g*), which is constantly carried around on the rotation of the shaft (*e<sup>2</sup>*) and can be moved longitudinally along the latter. On the interior surface of the coupling disk (*g*), slots or holes (*g'*) are provided and are for the purpose of meshing with one or more pins (*e'*) provided on the pin-wheel (*e*); an interior spring (*g<sup>2</sup>*) tends to maintain the coupling (*g*) constantly engaged with the pin-wheel (*e*).

Now, in order that the coupling can be maintained in the disengaged position, the shaft (*e<sup>2</sup>*) is provided with a bayonet groove (*e<sup>3</sup>*, *e<sup>4</sup>*) in which can be displaced a pin (*g<sup>3</sup>*) provided on the coupling (*g*). The coupling (*g*) can be disengaged by hand or by the intermediation of a manipulating lever (*g<sup>4</sup>*).

The reel (*d*) is rotated by the pin-wheel (*e*) by the intermediation of a transmission cord or belt (*e<sup>5</sup>*), which latter is preferably elastic.

Now, in order to establish or interrupt the mechanical connection between the pin-wheel (*e*) and the receiving wheel (*d*), this latter may be provided at its extremity with two pulleys, the one (*d'*) of which fixed to

the reel and the other (*d<sup>2</sup>*) turning loose; the displacement of the transmission cord or belt from the fixed to the loose pulley, or vice versa, can be effected by means of a disengaging bar (*d<sup>3</sup>*) fitted to the part (*a*).

The shaft (*e<sup>2</sup>*) is rotated by the cog-wheel (*h*) of the mechanism of the phonograph by the intermediation of two shafts (*f'*) and (*f*) (Fig. 15); these two shafts are carried in a framework (*f<sup>2</sup>*) provided with a collar (*f<sup>3</sup>*) fitted to one of the columns or pillars of the clock-work of the phonograph. The present arrangement can consequently be applied to all existing phonographs. When the apparatus is utilized for causing a band to be unwound synchronously with the emissions of the phonograph, one of the slides of the guides is provided with a rod (*o*) along which an indicator or pointer (*n*) can be moved; at the moment the first sound is emitted by the phonograph, this pointer (*n*) will be brought in front of the first inscription of the band.

For the case in which the apparatus is employed for inscribing the indicating band, the guides (*a'*) are provided with one, two, or more electric styles (Fig. 12); for example, on the upper guide are mounted two styles (*p'*) (*p<sup>2</sup>*), and on the lower guide a style (*p<sup>3</sup>*). Each of these styles is formed by a pencil holder (*p*), the lead of which is constantly held in contact with the band by the action of the spring (*p<sup>4</sup>*) (Fig. 13). These pencil holders are respectively fitted to the armature of the electro-magnets (*q'*, *q<sup>2</sup>*, *q<sup>3</sup>*); the two electro-magnets (*q'*, *q<sup>2</sup>*) of the two upper styles are arranged in the same circuit and are actuated by the same manipulator (*r*), these two styles will trace two identical graphic records on the band; the use of these two styles is a precautionary measure for the case in which one of them for any reason whatsoever might fail to act. These two upper styles are for the purpose of tracing the rhythmic graphic record. The lower style is arranged in a separate circuit and is controlled by a second manipulator (*r'*). This lower style is for the purpose of marking on the band certain indicating signs, reference marks and the like.

The two manipulators may be arranged as shown in Fig. 16 on the right and on the left of the phonograph so that the operator can operate the manipulator (*r*) with the right hand and (*r'*) with the left hand, while at the same time following the band as it is unwound on the board (*a*). If at a certain moment it is necessary to stop the movement of the band, the operator will only have to act on the lever (*g<sup>4</sup>*) in order to disconnect the coupling.

If it is desired to maintain the coupling disk connected while the phonograph continues working, the coupling (*g*) will be turned slightly from right to left by hand,



whereby its spring ( $g^3$ ) will be drawn back and engage in the part ( $e^4$ ) of the groove of the shaft ( $e^2$ ). When it is desired to start the band again, the coupling will be turned

5 in the inverse direction, so as to bring the pin ( $g^3$ ) into the part ( $e^3$ ) of the groove; the coupling ( $g$ ) under the action of the spring ( $g^2$ ) will then reengage with the pin-wheel ( $e$ ).

10 The whole of the arrangement can be completed by a desk ( $t$ ) for the purpose of receiving, for example, the score containing the piece sung by the phonograph when it is desired to control the piece inscribed on

15 the score and the inscription of the rhythmic band.

In the modification shown in Figs. 17 to 21, the pin-wheel ( $e$ ) is covered over by cap or case I which can turn around its pivots 2; this cap is for the purpose of maintaining the rhythmic band ( $b$ ) in contact with the upper part of the pin-wheel ( $e$ ); this arrangement permits at the commencement of an operation of more easily placing the band

20 ( $b$ ) in position, inasmuch as it suffices to raise the cap I, to place the free end of the band on the upper part of the wheel ( $e$ ) and to push down the cap I again. This modification, furthermore, comprises a special device for actuating the engaging and disengaging gear of the pin-wheel ( $e$ ), and of the receiving reel ( $d$ ). This arrangement is combined so as simultaneously to control the engaging or the disengaging of

25 the said pin-wheel and the reel so as to avoid the possibility of any wrong manipulation.

The pin-wheel ( $e$ ) and the receiving reel ( $d$ ) are both mounted loose on their respective spindles ( $e^2$ ,  $d^4$ ), and are rotated by

30 two couplings ( $g$ ,  $d^5$ ). These latter are respectively fixed to two pulleys ( $e^6$ ,  $d^6$ ), connected together by transmission belt or cable ( $e^5$ ). The coupling ( $g$ ) is firmly attached to the shaft ( $e^2$ ) as regards the rotary

35 movement, but can be freely displaced longitudinally along this shaft. The coupling ( $d^5$ ) is altogether loose on its shaft or spindle ( $d^4$ ).

The two couplings ( $g$ ), ( $d^5$ ), are provided

40 with holes or recesses on their inner surface which are intended for engaging with one or more pins or projections provided on the pin-wheel ( $e$ ) and the reel ( $d$ ) as shown in Fig. 21. The displacements of the two

45 couplings ( $g$ ,  $d^5$ ) are controlled by levers ( $g'$ ,  $d^7$ ), and these latter are actuated simultaneously by a single cam 3 keyed to a spindle 4 provided with a manipulating lever 5. According as the latter is moved in one or

50 the other direction, so will the couplings ( $g$ ,  $d^5$ ) be moved forward or drawn back on their respective spindles and will thus occasion the connecting up or disconnection of the pin-wheel ( $e$ ) and the reel ( $d$ ).

Springs 6, 7 constantly tend to maintain 65 the couplings ( $g$ ,  $d^5$ ) in connection with the pin wheel ( $e$ ) and the receiving reel ( $d$ ).

Fig. 20 shows the method of mounting the desk ( $a$ ) on a support 8 of special shape fitted to the wall of the box of the phono- 70 graph.

The present system of rhythmic inscription is capable of numerous applications.

The present apparatus can be advantageously employed for recording phono- 75 graphic disks.

At present when an artist sings or speaks in front of a phonograph for the purpose of recording a piece, he is constantly preoccupied with the necessity of terminating his

80 piece within the required time, and if the recording of the piece has not been finished at the moment in which the recording style has reached the end of its course on the disk or cylinder the latter will be of no use, and

85 the artist will have to recommence his piece; but, inasmuch as, in order to obtain a sharp inscription on the disk, it is necessary to sing or speak out very loud, the result will be very tiring. The present system of rhythmic indicator does away with this inconvenience. Before performing a piece out aloud the artist first sings it softly while the phonograph or the registering apparatus turns without disk or cylinder, while at the same

90 time rotating a band on which the operator traces the rhythmic graphic record of the song to be recorded by scanning on the manipulator the syllables of his song. If the piece is performed within the required

95 time, the syllables may then be inscribed on the band in front of the corresponding lines of the graphic record; while if, on the contrary, the piece has not been terminated within the required time, the artist will

100 have to begin again, but this fresh performance of the piece will not tire him because, as has been stated, he is only singing softly, without effort and consequently without fatigue.

When the rhythmic graphic record of the piece performed has been obtained within the required time, the wax disk is placed on the phonograph, and the band inscribed with the graphic record is introduced into

105 the apparatus. The phonograph is then started, and the artist performs the piece at the top of his voice; as the band is unwound at the same speed as during its inscription, he has no longer to worry himself about the

110 time allotted to him, only having to sing according to the inscriptions of the band passing in front of his eyes.

The present apparatus may also be used for any kind of instruction, because the

115 agreement which it supplies between the signs read and the sounds heard produces in the brain an intimate correlation between



these signs and these sounds and by frequent repetition this correlation can be fixed in the mind.

The present apparatus can be used for the instruction of languages; thus, the phonograph might pronounce a series of foreign words, and the band would present to the eyes of the auditor either their translation or their spelling; the agreement of the inscriptions of the band and of the words pronounced by the phonograph would also be obtained by means of a graphic inscription, as described above. By this method of teaching, the auditor would be rapidly familiarized with the signification of the words or with their pronunciation.

In the case in which the indicating band has to be read by several persons at one and the same time, the apparatus will be of larger dimensions and the band will be exposed at a suitable height above the ground. With the present indicating apparatus mechanical pianos or organs may be employed for accompanying a piece performed by an artist or by a phonograph.

As previously described, a rhythmic graphic record of the piece would be first inscribed; then according to this graphic record will be determined the position of the perforations of the cards or rolls of these mechanical pianos or organs so as to establish the agreement between the accompaniment and the song; it will then suffice mechanically to connect the actuating mechanism of the rolls of the mechanical piano or organ with that of the phonograph, or the actuating device of a rhythmic band in accordance with that which has served to manufacture these rolls, in order to obtain synchronism between the accompaniment executed by the mechanical piano or organ and the piece sung by the phonograph or artist. In the case in which the piece is performed by an artist, it suffices for the latter to sing, speak or play while following the passage of the rhythmic band.

The present indicating apparatus may also be applied for synchronizing the movement of a cinematograph with those of a phonograph in the following manner. The artist will be kinematographed or photographed kinematographically while singing softly during which time a rhythmic graphic of this song will be inscribed on the band. This band is then unwound in the apparatus at the same speed, and the artist sings out

loud before the phonograph while following the inscriptions of the band passing along in front of him.

It is to be understood that the term "phonograph" as hereinafter used in the claims is sufficiently broad to include equivalent apparatus of other names, the nature of which apparatus has been pointed out elsewhere in this specification. It is clear also that the present indicating apparatus for recording the rhythm is capable of numerous other applications, and that the shape, dimensions and arrangement of detail may vary according to the applications.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. In a sound producing device, a movable support for a sound producing record, a band run in synchronism with said support, and electrically controlled means for impressing on said band, a graphic record for indicating rhythm.

2. In a phonograph, a movable support for a sound producing record, a band run synchronously therewith, and electro-magnetically controlled means for impressing on said band a graphic record for indicating rhythm.

3. In a phonograph, a movable support for a sound producing record, a band run synchronously therewith, and key controlled electro-magnetic means for impressing on said band, a graphic record for indicating rhythm.

4. The combination of a phonograph having a driving mechanism, of a movable member driven from said driving mechanism and having a surface adapted to receive a graphic record, electrically controlled means for impressing a graphic record upon said surface including a marker laterally movable with respect to said surface, and a manually operable member for controlling said electrically controlled means, the length of the graphs depending upon the rate of movement of the movable member and the successive operation of said manually operable member.

In testimony whereof I affix my signature in presence of two witnesses.

MICHEL DE PEZZER.

Witnesses:

HENRY DANZER,  
LUCIEN CRESPIN.



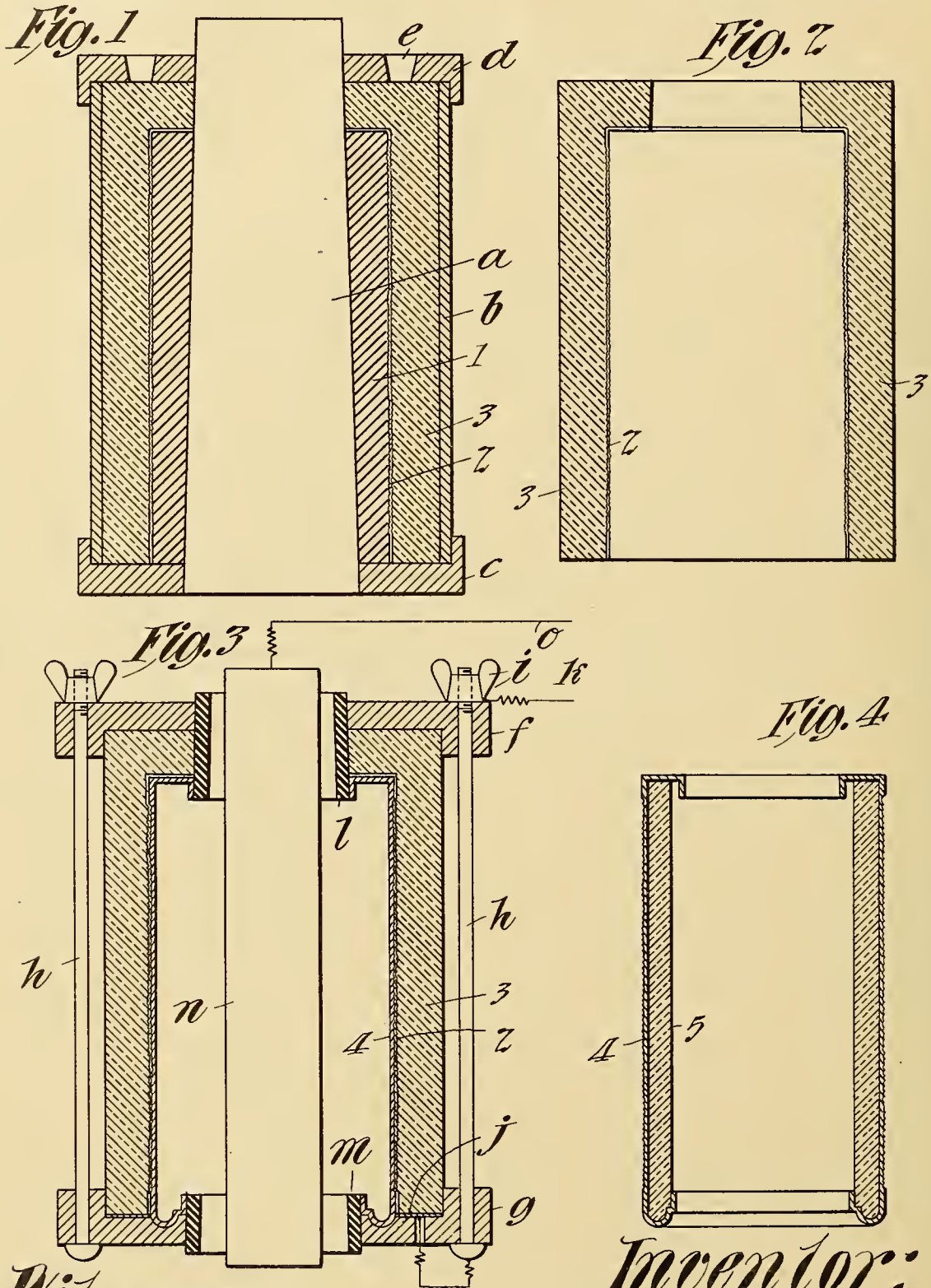




J. W. AYLSWORTH.  
 PROCESS OF MAKING DUPLICATE PHONOGRAPH RECORDS.  
 APPLICATION FILED SEPT. 4, 1909.

1,101,827.

Patented June 30, 1914.



*Witnesses:*  
 Frank D. Lewis  
 Delos Stoddard

*Inventor:*  
 Jonas W. Aylsworth  
 by Frank L. Dyer  
 his Att'y.

# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PROCESS OF MAKING DUPLICATE PHONOGRAPH-RECORDS.

1,101,827.

Specification of Letters Patent.

Patented June 30, 1914.

Application filed September 4, 1909. Serial No. 516,309.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Process of Making Duplicate Phonograph-Records, of which the following is a description.

My invention relates to a process for making phonograph records in which the wearing surface is entirely of metal. This material may constitute the entire record or may be a shell provided with a backing of other material.

The process is particularly adapted to the manufacture of cylindrical phonograph records, although it may be used for making records of the disk type, if desired.

Cylindrical sound records at the present time are generally made of a waxlike material molded or cast within a hollow matrix, and disk records are formed of somewhat harder material, employing considerable quantities of shellac, the impression being secured from a flat matrix. With both types of record the material is subjected to considerable wear when used in a phonograph or talking machine, and such wear becomes objectionably great when the width of the record groove is decreased beyond a certain point or when the pressure of the stylus upon the record is increased beyond a certain point. It has also been proposed to use for cylindrical records a material harder than the waxlike material just referred to, for instance, celluloid. Such records, however, are generally found to be of poorer quality as regards sound reproduction than those of waxlike material, and they appear to deteriorate with time. Moreover, a celluloid record is also subjected to objectionable wear when the width of the record groove is diminished or the pressure of the stylus increased beyond a certain limit. It has also been proposed to make duplicate phonograph records in metal, but such processes have been objectionable in that it has been necessary to destroy the matrix in order to liberate the metallic duplicate.

By the present invention it is possible to readily free the metallic duplicate from the matrix without injury to the latter whereby the same may be used for the production of an indefinite number of copies.

In order that the invention may be better

understood, reference is made to the accompanying drawing, of which—

Figure 1 is a central vertical section of apparatus for producing the matrix within which the metallic records are to be deposited; Fig. 2 is a similar view of the matrix after being removed from the mold of Fig. 1, and after the master has been removed therefrom; Fig. 3 is a similar view showing apparatus for producing a metal deposit within the matrix to form the record or record wearing surface, and Fig. 4 is a similar view of the completed record in its preferred form.

In all of these views corresponding parts are designated by the same reference numerals.

The first step in the process consists in the obtaining of a master record. This record may be cut or molded in the usual way and differs from the ordinary master record only in respect to the material of which it is composed. This material should be insoluble in cold acetone or amyl acetate or equivalent solvent of the material which is to be used for forming the interior surface of the matrix, which will be hereinafter described. Such a material suitable for the making of a master record is montan wax, although other or equivalent materials may be used for this purpose. Having obtained such a master record 1, it is coated with a film 2 of tough or wear resisting material such as pyroxylin or aceto-cellulose or equivalent material, by dipping the master in a suitable solution; for instance, to produce a coating of pyroxylin, it may be dipped into a five to ten per cent. solution of pyroxylin in a mixture of acetone and amyl acetate, and in order to produce a coating of aceto-cellulose the master may be dipped in a five to ten per cent. solution of cellulose acetate in a mixture of acetone and acetic acid. After the master has been dipped in such a solution, the film is dried upon and adheres to the master and when thoroughly dry the coated master is placed in a suitable mold, and a film support or backing 3 is cast around it. The mold referred to is illustrated in Fig. 1 and comprises a centering device *a*, a cylinder *b*, base *c* and cap *d* having openings *e* through which the molten material is poured to form the backing 3. This material should be such as has a relatively high coefficient of expansion by heat



as compared to metals, and which will not dissolve in the solvent which is used for removing the master record as will be herein-after described. Various materials may be used, but I have obtained desirable results by using a composition of shellac and a solid solvent for shellac which melts readily into a thin fluid, such as dinitrobenzol or tetrachloronaphthalene. After the casting operation has been completed, the mold is taken apart and separated from its contents, to-wit, the master 1 with the film 2 and backing 3 all firmly adhering to each other in a solid mass. The master 1 is then dissolved in benzene or an equivalent solvent which does not dissolve either the film 2 or backing 3. This operation may be expedited by reaming out the bulk of the master leaving only a thin shell adhering to the film 2 and then dissolving out this shell. These steps result in the matrix shown in Fig. 2, composed of a body or backing 3 of considerable strength, and a lining 2 of a tough or wear resisting material, the whole having a high coefficient of expansion by heat as compared with metals. In order to obtain a metallic record from a matrix of this character, the interior and the lower end are first provided with an electrically conductive coating, such as finely divided graphite or gold deposited *in vacuo*, and the matrix is then placed in a holding frame suitable for the application of current thereto in an electro-plating bath. This frame is illustrated in Fig. 3, and consists of upper and lower clamping plates *f* and *g*, held together by headed bolts *h* and wing nuts *i*, the matrix resting upon a contact plate *j* which is electrically connected with the bolt *h* and leading in wire *k*. Upper and lower rings *l* and *m* of insulating material are held by the plates *f* and *g* respectively, and conductive coatings are applied to such parts of these rings and of the plate *g* as it is intended shall receive a metallic deposit to form the shell 4. The anode *n* of copper, zinc or other suitable metal, is inserted within the frame and connected to the wire *o*, and the whole is placed in a cold plating bath and a thin coating or shell 4 of the anode metal is plated upon a matrix and adjacent parts as shown. The plating bath should be maintained at a constant temperature, preferably below 50 degrees Fahrenheit. This can readily be done by means of an ice jacket. The plating operation requires only a few minutes and the frame and contents are then removed from the bath, washed and placed in warm water, whereupon the matrix expands and the metallic record or shell 4 may be withdrawn from the same by longitudinal movement. This shell, if of sufficient thickness, may be used commercially as a phonograph record, or, if it is desired to strengthen the same,

it may be placed in a revolving chuck and molten material or cement admitted to the interior thereof which upon hardening forms a backing 5. A suitable material for this purpose is plaster of Paris. The record may of course be plated with a non-oxidizing metal such as nickel, silver, gold, etc., to secure permanence. The matrix, after the removal of the metallic shell, is uninjured and may be cleaned and dried and used in the manner described for an indefinite number of times for producing metallic records.

I find that while it is desirable to remove the waxlike master from the matrix wholly or in part by solution, it is practicable to remove it by relative change of diameter when the matrix backing is made of a composition consisting of 140 parts of metadinitrobenzol, and 100 parts shellac. In such case by placing the contents of the mold in a refrigerating chamber and cooling the same, the master 1 contracts enough more than the matrix to disengage itself from the coating 2 and may be withdrawn to leave the matrix. Even in this case, however, it is desirable to apply the solvent (benzene) to the bore of the matrix to remove any particles which may have been torn from the surface of the master by adhesion to the coating or matrix lining.

While it is preferable to cast the backing 3 upon the film 2 in the manner described, it is possible to cement thereon a backing previously formed, as a cylinder of hard rubber, and to carry out the process in other respects in the manner previously described. It is also possible to dispense with the film 2 and cast the material 3 directly around the master 1, but in this case there are likely to be flaws upon the record surface of the matrix, and this is particularly true of records of very fine pitch such as one two-hundredth of an inch or less. I therefore prefer to practise the process in the manner which I have fully set forth as the preferred method, the invention, however, covering all such modifications as fall within the scope of the claims.

Having now described my invention, what I claim is:

1. The process of duplicating sound records which consists in forming on a master record a matrix of material whose coefficient of expansion by heat is relatively high as compared with metals, removing said master from said matrix, forming a metallic record on said matrix, and raising the temperature of said matrix to separate the same from the metallic record, substantially as set forth.

2. The process of duplicating phonograph records which consists in applying to a master record a solution of a suitable material to form thereon a coating, applying to said coating a backing of material whose coefficient



cient of expansion by heat is relatively high as compared with metals, removing said master to leave the said coating and backing as a negative record or matrix, electroplating metal upon the surface of said matrix, and raising the temperature of the latter to separate the same from the metallic deposit, substantially as set forth.

3. The process of duplicating phonograph records which consists in forming around a master record a matrix of material whose coefficient of expansion by heat is relatively high as compared with metals, removing said master therefrom, electroplating metal upon the surface of said matrix, and raising the temperature of the latter to separate the same from the metallic deposit by relative change of diameter, substantially as set forth.

4. The process of duplicating sound records which comprises forming a matrix of non-metallic material whose coefficient of expansion by heat is relatively high as compared with metals, electroplating thereon a body of metal to form a metallic positive, raising the temperature of said matrix to separate the same from said positive, and thereupon removing the metallic positive from the matrix by relative longitudinal movement, substantially as set forth.

5. The process of duplicating phonograph records which comprises obtaining a master record insoluble in a solution of pyroxylin or its equivalent, applying thereto such a solution to form thereon a coating, applying to said coating a backing of material whose coefficient of expansion by heat is relatively high as compared with metals, removing said master to leave said coating and backing as a negative record or matrix, electroplating on said matrix a coating of metal to

form a metallic positive, raising the temperature of said matrix to cause it to expand sufficiently to free the said positive therefrom, and removing said positive from said matrix by relative longitudinal movement, substantially as set forth.

6. The process of duplicating phonograph records which comprises obtaining a master record insoluble in a solution of pyroxylin or its equivalent, applying thereto such a solution to form thereon a coating, and then removing said master to leave the said coating as a negative record surface or matrix, substantially as set forth.

7. The process of duplicating phonograph records which comprises obtaining a master record insoluble in a solution of pyroxylin or its equivalent, applying thereto such a solution to form thereon a coating, applying to said coating a backing of material whose coefficient of expansion by heat is relatively high as compared with metals, and then removing said master wholly or in part by solution to leave the said coating as a negative record surface or matrix, substantially as set forth.

8. The process of duplicating phonograph records which comprises applying to a master record of waxlike material a solution of pyroxylin or its equivalent to form a coating, casting around the coating a backing of non-metallic material and removing said master from said coating by solution to leave a matrix, substantially as set forth.

This specification signed and witnessed this 3rd day of Sept. 1909.

JONAS W. AYLSWORTH.

Witnesses:

DELOS HOLDEN,  
DYER SMITH.







F. W. H. CLAY.  
METHOD OF RECORDING AND REPRODUCING SOUND.  
APPLICATION FILED OCT. 25, 1907.

1,101,906.

Patented June 30, 1914.

FIG. 1

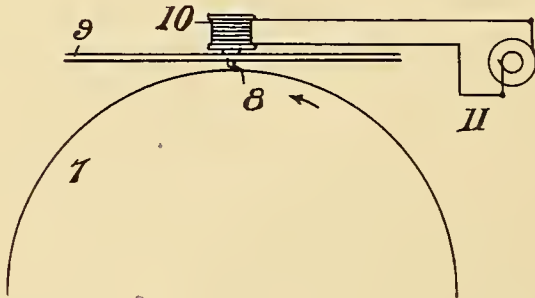


FIG. 2

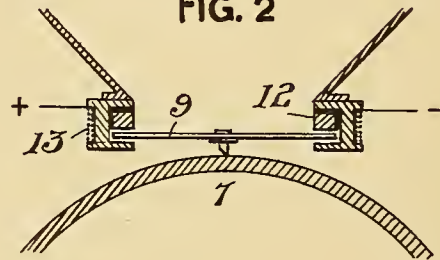


FIG. 3

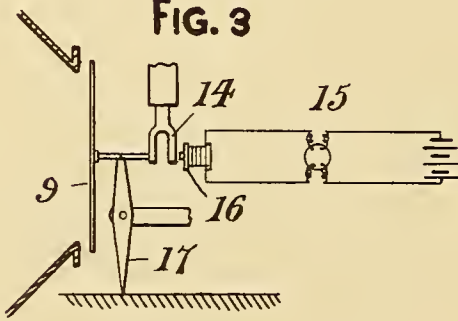


FIG. 4

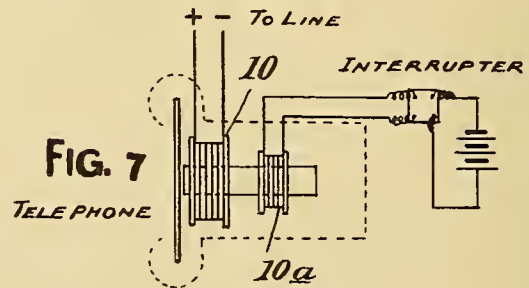
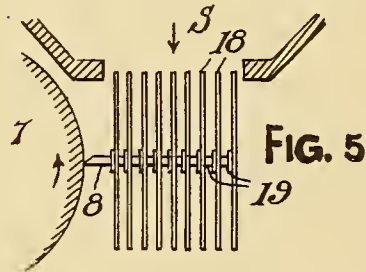
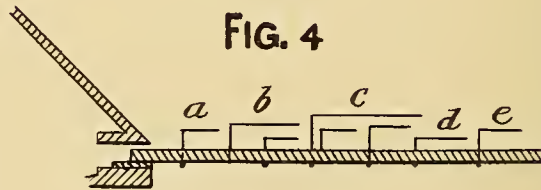
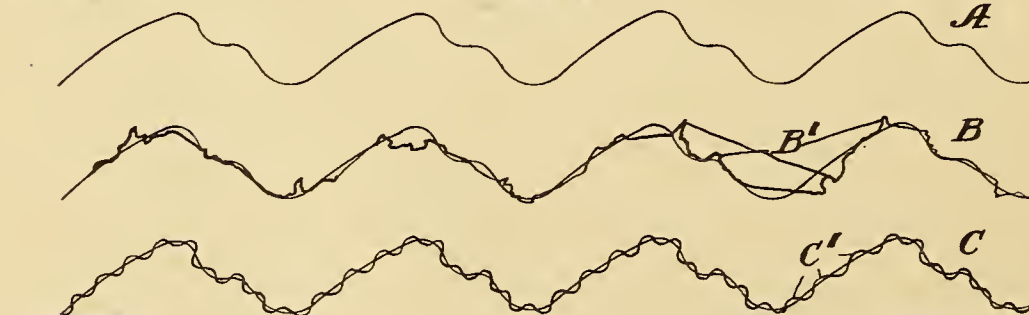


FIG. 6



WITNESSES

J. B. Appleman,  
Fred H. Staub.

INVENTOR

Francis W. H. Clay  
BY  
C. M. Clark  
ATTORNEY

# UNITED STATES PATENT OFFICE.

FRANCIS W. H. CLAY, OF PITTSBURGH, PENNSYLVANIA.

METHOD OF RECORDING AND REPRODUCING SOUND.

1,101,906.

Specification of Letters Patent.

Patented June 30, 1914.

Application filed October 25, 1907. Serial No. 399,112.

*To all whom it may concern:*

Be it known that I, FRANCIS W. H. CLAY, a citizen of the United States, residing at Pittsburgh, Pennsylvania, have invented a certain new and useful Method of Recording and Reproducing Sound, of which the following is a specification.

My invention relates to the art of recording and reproducing sound waves and its primary object is to smooth the irregularities of natural sound wave records, and avoid the noises incident to the reproduction, etc.

Other objects will appear hereinafter.

I have here illustrated the method as applied to instruments such as phonographs and gramophones, but it obviously has many other applications such as telephoning.

In the accompanying drawing Figure 1 is a diagram illustrating the recording of sound on a wax cylinder, and Fig. 2 a modification of the apparatus. Fig. 3 illustrates the apparatus which may be used for recording on flat surfaces. Fig. 4 illustrates a construction of a sound actuated diaphragm and Fig. 5 illustrates another modification for dampening irregular waves. Fig. 6 illustrates some forms of sound waves. Fig. 7 illustrates the application of the invention to telephoning.

In the study of sound waves I have discovered that the probable cause of impure tones is the superimposition, upon the wave form, of irregular subsidiary waves. And a pure tone is distinguished from an impure tone not so much by the absence of the superimposed waves, as by their being regular. The tympanum of the ear is probably in incessant complicated motion and the physiological effect of a pure tone is largely due to submerging the irregular motions by causing the hearing organs to swing in regular rather than irregular order. In the sound records at present used in phonographs, etc., the reproducing diaphragm never vibrates without both fundamental and overtone, and in addition undesirable and minute superposed vibrations of irregular form. This is due in part to the imperfections in the structure of the record, and in part to the independent and irregular vibrations of the diaphragm. It is obvious that if the diaphragm is swinging with a regular periodicity, even if it makes an inaudible vibration, this will submerge or drown out the noisy sounds, for noise differs from musical sound only by

reason of the irregularity of vibration. It is the object of my invention to accomplish this end either by altering the shape of the sound record, or by impressing minute regular vibrations on the reproducing diaphragm.

Referring first to Fig. 6, a pure tone might be illustrated by the form A; but owing to mechanical imperfections the actual form of the waves produced by phonographs is that shown at B. At C is illustrated a form of wave in which the superimposed minute vibrations on the fundamental and overtone wave form are made regular rather than irregular. In other words if the cause of the noise, that is, the irregular forms on the wave B, can be reduced to a regular periodicity as in C, this superposed form can still be so small as to be inaudible. In other words a wave form such as C would produce on the ear the effect of a simple and perfectly smooth sound, because the ear cannot respond to the small undulations C', while they could perceive the irregular vibrations B' because of the irregular beats produced by them in combination with the fundamental.

In Fig. 1 the wax cylinder 7 upon which the sound record is made by the motion of the cutting tool 8, which in turn is moved by the diaphragm 9 actuated by the sound waves, must have cut on it a record which will be the resultant of all the motions of the diaphragm and of the varying resistance of the cylinder material. It is evident that if diaphragm 9 be constantly swinging at a regular rate it will not be so susceptible to irregular motions, and it is also evident that this regular swinging movement would not interfere with the larger movement due to the sound waves. Suppose for example the diaphragm cutting tool were throughout the recording process swinging with frequency above limits of audition, somewhere about 40,000 per second. All the audible sound waves desired would have a periodicity not greater than about 10,000 and the supplementary swinging of the diaphragm might be made as low as twenty thousand in some instances. Any convenient means can be used for superposing the supplementary vibrations and I have illustrated a magnetic coil 10 which is excited by an alternating current source 11 having a periodicity above the limits of audition. The diaphragm 9 of course may be of iron and thereupon it



will be kept constantly swinging at this high frequency, without interfering with its response to the ordinary sound waves. Various forms of apparatus may be used for supplying the supplementary vibration; as in Fig. 2 the magnetic ring 12 may be excited by coil 13 electrically, and operate on the edges of the recording disk 9. Mechanical means of course might equally well be used for vibrating the disk.

In Fig. 3 is a form of apparatus for recording on a flat surface and here the diaphragm may be operated on by tuning fork 14 kept vibrating by means of an electrical interrupter 15. The recording point 17 will thus be in constant motion at a rate of say 5,000 per second, and this swinging will drown out the tendency to move under the influence of irregular sound waves. By reason of the momentum also, the recording point obviously will not be in responsive condition for making irregular movements. In both of the forms of apparatus it will be observed also that the varying resistance to cutting, in the material of the cylinder or plate, will be rendered unvarying by reason of the energy of the supplementary vibration, and this will leave the instrument freer to respond to the actual sound waves being recorded. Conversely, in reproducing the sound waves, the stylus and diaphragm will manifestly be kept in the state of extremely rapid and regular vibration of too high frequency to be heard, and this motion will by reason of the momentum prevent any response to irregular noises. The same object of submerging irregular vibrations may be accomplished by covering the diaphragm with a large number of small elements having a definite period of vibration, which will serve to dampen all motions of the diaphragm, except those in harmony with themselves, and thus purify the tone. Thus in Fig. 4 a series of wires A, B, C, D, E, F, each of a length and weight to respond to a simple note, are attached to the diaphragm which is used either for recording or reproducing.

For recording various other methods of dampening irregular vibrations may of course be used and I have illustrated in Fig. 5 one in which a series of independent diaphragms 18 are placed side by side and communicating their motion by elastic links 19, so that the recording stylus 8 will be influenced by the cumulative effect of the various diaphragms,—it being understood that the space between diaphragms is open and the sound waves are directed in at the point S. Thus the irregular vibrations of the several diaphragms will mutually suppress each other, since the whole set cannot affect the stylus except by acting in unison. Another use of the dampening devices is when they are tuned to different frequencies, they

will cause sound beats which will increase the amplitude of the desired sounds, and by this means such devices as amplifying horns may be done away with, it being understood that a particular sound wave may be rendered louder not only by increasing the amplitude of motion but by sharpening the apex of the wave. If therefore in the recording device the subsidiary vibrations are made to be a multiple to each of the natural musical tones there will be a regular beat at the crest of each musical tone wave between the fundamental and subsidiary impressed waves. This will amplify the sound and reproduction. Obviously this method of suppressing irregular vibrations may be applied to other instruments such as telephones. For example if a telephone receiver diaphragm be kept in constant vibration at a rate above the limit of audition, this will dampen or cancel all irregular vibrations without interfering with the slower swing of the vocal sounds, and the same method may be used also in the transmitter. Various other uses of this method will occur to those familiar with the art and need not be here set forth in detail.

I believe I am the first to discover that noise may be suppressed by substituting for the noise wave an inaudible regular wave. However, the impressed supplementary wave may of course be made audible with some good effects. The fundamental idea of the invention may be illustrated mechanically by saying that it is the object of the supplementary regular waves to comb out the irregularities from the regular sound waves. While I am also the original inventor of means for impressing upon a sound recording instrument a supplementary regular vibration of inaudible frequency, the apparatus herein disclosed is not claimed herein, but in my co-pending application No. 724,744 filed Oct. 9, 1912.

Having thus described my invention and illustrated its use what I claim as new and desire to secure by Letters Patent is the following:

1. The method of recording sound waves which comprises impressing upon the ordinary motions of the recording instrument, a supplementary regular series of high frequency vibrations.
2. The method which consists in suppressing noises by forcing a vibrating member to regular vibration of higher frequency than the sound waves independently of the source of the sound wave frequency.
3. The method of recording sound which consists in vibrating a recording instrument by the agency of sound waves and impressing on it a regular vibration of higher frequency than that of audible sound.
4. A sound record having in addition to the undulations of the recorded sounds, a



regular series of undulations of higher frequency.

5 5. A sound record consisting of an undulating surface in the form of a sound wave, and a superposed regular succession of undulations of much higher frequency.

10 6. The method of suppressing the effect of accidental noise vibrations on a sounding diaphragm, by forcibly maintaining the diaphragm in regular vibration at a frequency

independent of and higher than the sound wave frequencies.

In testimony whereof I have hereunder signed my name this 24th day of October, 1907.

15

FRANCIS W. H. CLAY.

Witnesses:

C. M. CLARKE,

FRED STAUB.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."







W. G. PEARSON.  
 GRAPHOPHONE RECORD CLEANER.  
 APPLICATION FILED DEC. 14, 1911.

1,102,073.

Patented June 30, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

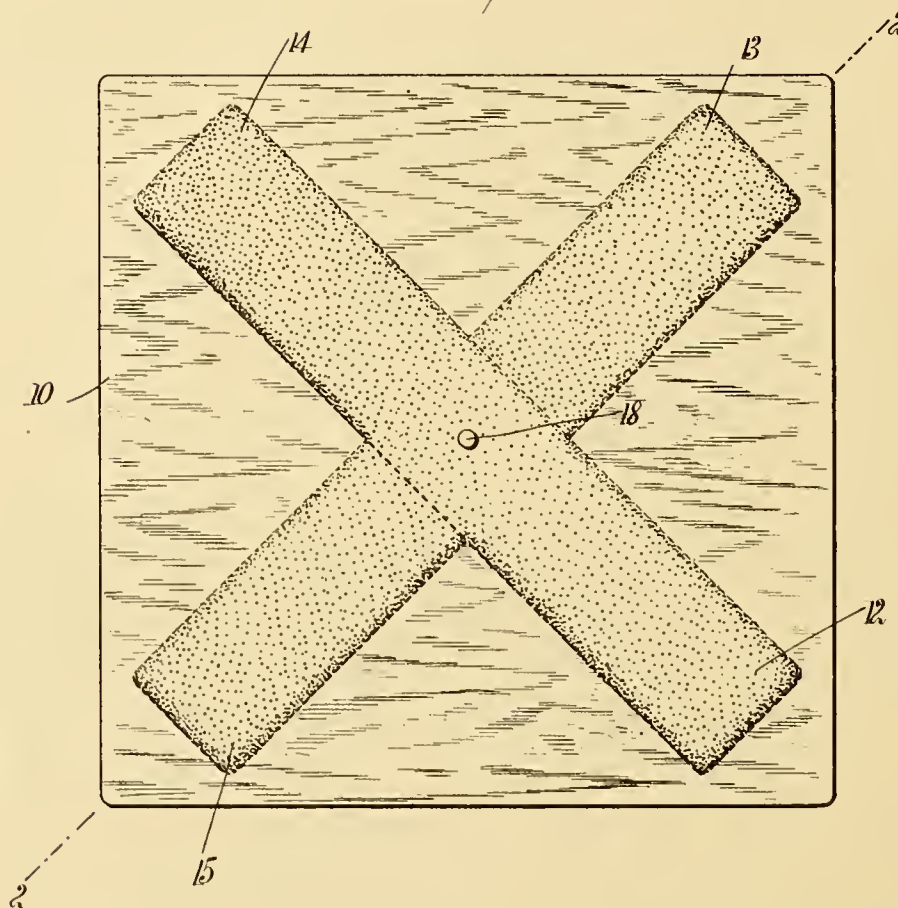


Fig. 2.

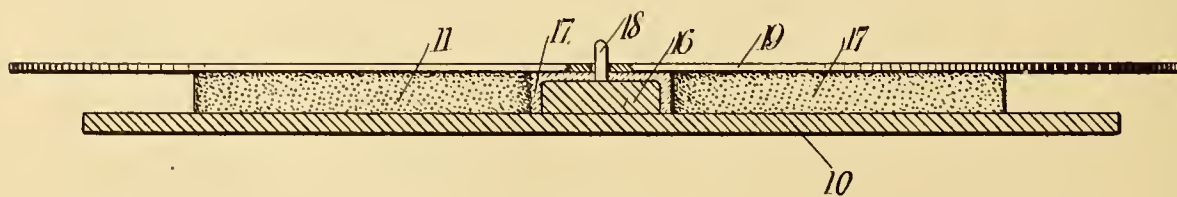
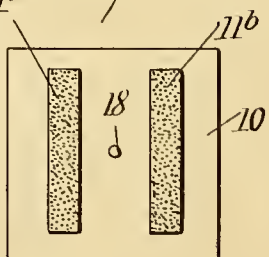


Fig. 3.



WITNESSES

H. J. Walker  
 L. J. Gallagher.

INVENTOR

Walter G. Pearson

BY

Munn & Co

ATTORNEYS



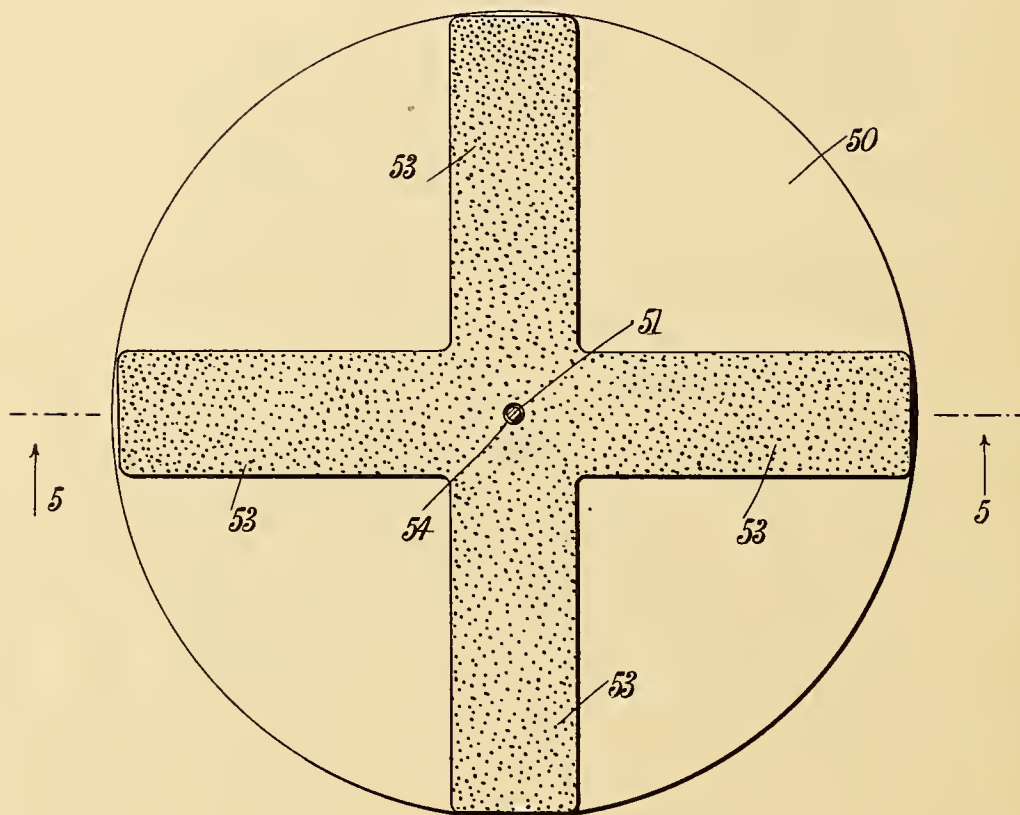
W. G. PEARSON.  
GRAPHOPHONE RECORD CLEANER.  
APPLICATION FILED DEC. 14, 1911.

1,102,073.

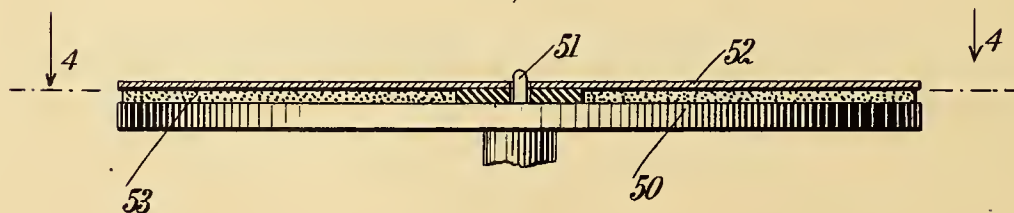
Patented June 30, 1914.

2 SHEETS—SHEET 2.

*Fig. 4.*



*Fig. 5.*



WITNESSES

*H. J. Walker*  
*L. J. Gallagher*

INVENTOR

*Walter G. Pearson*

BY *M. J. Co.*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

WALTER GUY PEARSON, OF NEWBURYPORT, MASSACHUSETTS.

## GRAPHOPHONE-RECORD CLEANER.

1,102,073.

Specification of Letters Patent.

Patented June 30, 1914.

Application filed December 14, 1911. Serial No. 665,634.

*To all whom it may concern:*

Be it known that I, WALTER G. PEARSON, a citizen of the United States, and a resident of Newburyport, in the county of Essex and State of Massachusetts, have invented a new and Improved Graphophone-Record Cleaner, of which the following is a full, clear, and exact description.

My invention comprises a new and improved cleaner for graphophone records, the construction and arrangement being such that records may be cleaned thoroughly and in a short time, the device being inexpensive in its make-up whereby it may be offered at a low price.

The provision of a device which may be easily manipulated is of some importance in setting forth the invention herein described, such ease of manipulation not being obtained at the expense of efficiency or thoroughness.

Reference is to be had to the accompanying drawings forming a part of this specification in which similar characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a plan view of one form of the device; Fig. 2 is a sectional view thereof along the line 2--2 of Fig. 1, the record being shown in position for cleaning; Fig. 3 is a plan view of a modified form; Fig. 4 is a top plan view of a graphophone turn table fitted with my device, on the line 4--4 of Fig. 5; Fig. 5 is a sectional view of the record and cleaning device on the line 5--5 of Fig. 4.

The device comprises a base 10 of any suitable shape or form and made of any desirable material, preferably, however, of wood, there being an elevated or raised cleaning element carried by this base, this element 11 preferably assuming the form of a cross, as shown in Fig. 1, and having the arms 12, 13, 14, and 15. It is not essential that the cleaning element assume this particular form as the cleaning may be accomplished by a plurality of such elements 11<sup>a</sup>, 11<sup>b</sup>, arranged as shown in Fig. 3, or in any convenient and proper manner. The idea is that by providing this elevated cleaning element along the lines described there will be a plurality of spaces between the under side of the disk or record which is being cleaned and the base, thereby permitting manipulation of the record by the hands during the cleaning operation.

The cross sectional form of each of the parts of the cleaning element may be anything desired, simplicity and convenient assembling being desirable, the form shown in Fig. 2, however, comprising a block 16 of rectangular formation, secured to the base 10 in any suitable manner.

The cleaning element proper is preferably pieces of carpet 17 held in position on the arms in any suitable manner, carpet being chosen because of the texture and weaving thereof, the nap extending outwardly from the body of the carpet affording a very effective medium for entering the grooves in the disk or record, thereby removing the dust or other accumulations therefrom in order to provide for more efficient operation of the record when placed in a suitable machine.

In order to maintain the record in position on the cleaning element I make use of a pivot 18 passing through the usual opening in the disk or record 19, the cleaning being accomplished by turning the record about this pin.

In Figs. 4 and 5 I have shown a modification of the inventive idea, the same involving the turn table 50 of a graphophone, the table being provided with the usual upstanding pin 51 on which the record 52 is positioned. In this instance the cleaning device comprises a piece of material, preferably shaped like a cross, as shown in Fig. 4, the arms 53 thereof being substantially equal in length and the central point of the cleaning device being provided with an opening 54 through which the pin 51 extends.

The material of which the cleaning device is made may be anything suited to the purpose but, as I have stated before, the preferred material is a piece of velvet carpet, the nap of which extending upwardly therefrom is very well adapted to engage the grooves of the record with a brush-like action, thereby effectively cleaning them.

The device may be left on the graphophone turn table if so desired or may be positioned thereon merely when it is desired to clean the records, the presence of the device in no way affecting the operation of the machine.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:—

1. A device for cleaning disk records of

phonographs, comprising a cleaning element formed of a plurality of members of fibrous material, and a support on the upper face of which the cleaning element is mounted, the support having a vertical pin projecting above the cleaning element and upon which a disk record is adapted to be mounted to rest on the said cleaning element.

2. A device for cleaning disk records of phonographs, comprising a cleaning element of fibrous material having a nap and in the form of a cross, and a support upon the

upper face of which the cleaning element is mounted, the support carrying a pin projecting above the cleaning element and upon which a disk record is adapted to be mounted to rest on the said cleaning element. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER GUY PEARSON.

Witnesses:

EDWARD HERRICK ROWELL,  
BLANCHE BUTLER KIMBALL.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

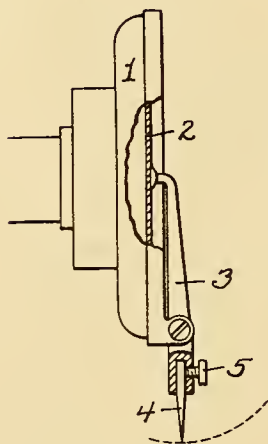




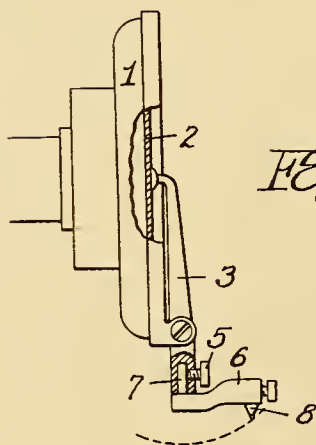
H. SHEBLE.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED AUG. 25, 1913.

1,102,090.

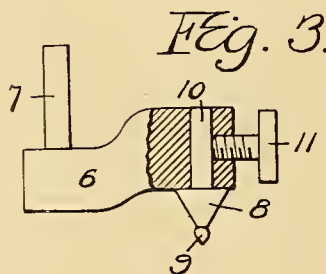
Patented June 30, 1914.



*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

Witnesses  
Hamilton D. Turner  
Elsie Fullerton

Inventor  
Horace Sheble  
by his Attorney  
Harry Smith

# UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA.

## SOUND-BOX FOR TALKING-MACHINES.

1,102,090.

Specification of Letters Patent.

Patented June 30, 1914.

Application filed August 25, 1913. Serial No. 786,445.

*To all whom it may concern:*

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to so construct a sound box for talking machines as to provide for the use of the same either in connection with a record having a "lateral-wave" groove or with a record having a "hill-and-valley" groove, such different records being employed without the necessity of changing the angular relation thereto of the sound box diaphragm. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which—

Figure 1 is a view, partly in side elevation and partly in section, of an ordinary talking machine sound box illustrating the same as designed for use with a record of the lateral-wave type; Fig. 2 is a similar view illustrating the sound box as adapted for use in connection with a record of the hill-and-valley type, and Fig. 3 is an enlarged view of the converting attachment shown in Fig. 2.

In Figs. 1 and 2 of the drawing, 1 represents the casing of the sound box, 2 the diaphragm thereof, and 3 the usual stylus lever pivotally mounted upon the casing 1 and having one of its arms connected to the diaphragm 2, the other arm being bored for the reception of the stylus 4 usually employed in connection with a record of the lateral-wave type, said stylus being secured in position by means of a clamping screw 5, or other suitable means. In order to permit such sound box, without changing the angular position of the diaphragm 2, to be employed in connection with a record of the hill-and-valley type I prefer to use, in place of the stylus 4, an attachment such as shown in Figs. 2 and 3, said attachment consisting of an arm 6 having near one end an upwardly extending pin 7 and at the other end a downwardly projecting stud 8 carrying a sapphire point 9 such as is usually employed in connection with a record of the hill-and-valley type. The pin 7 can, after the removal of the stylus 4, be secured

to the stylus lever 3 in the same manner as said stylus. The stud 8 has a stem 10 adapted to an opening in the arm 6 and secured therein by means of a clamping screw 11, or other suitable means. In order to secure like results in reproduction with either type of record, the sapphire point 9 should, when it is used, be at the same distance from the fulcrum of the lever 3 as the point of the stylus 4, when the latter is used, and in order to effect this result I bend the arm 6, as shown in Figs. 2 and 3, so that the member of said arm which carries the stud 8 shall be in a different horizontal plane from the member which carries the pin 7.

My invention is intended to be used in connection with a machine having a stylus 4 of a given length, hence as said stylus is always introduced into the opening in the stylus lever so as to seat against the bottom of said opening, its point is always at a given distance from the fulcrum of said stylus lever.

The diaphragm 2 retains its normal position, that is to say, a position at right angles to the horizontal face of the record, whether the latter is of the lateral-wave or of the hill-and-valley type.

I claim:—

The within described attachment for adapting for use with a record of the hill-and-valley type a sound box normally intended for use with a record of the lateral wave type, said attachment consisting of an arm having at one end an upwardly projecting pin for entering the stylus receiving opening of the stylus lever of the sound box, said arm being offset at the other end and carrying at that point a downwardly projecting stylus whereby the latter will engage the hill-and-valley record at the same distance from the fulcrum of the stylus lever as is the point of a lateral wave engaging stylus of normal length occupying its predetermined position in the stylus lever.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HORACE SHEBLE.

Witnesses:

KATE A. BEADLE,  
HAMILTON D. TURNER.





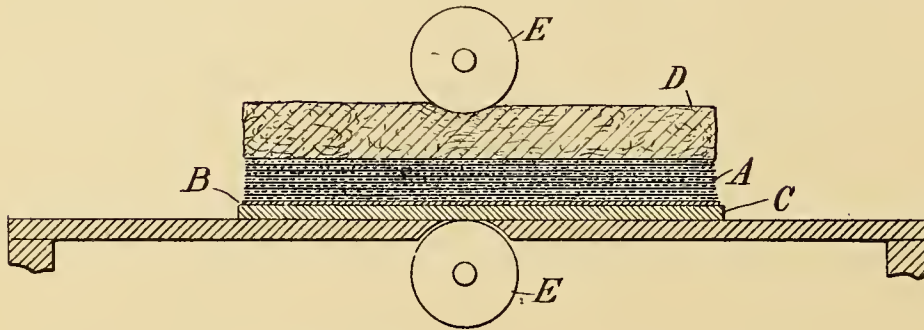


V. H. EMERSON, G. A. MANWARING & J. K. REYNARD.  
COMPOSITE DISK SOUND RECORD.  
APPLICATION FILED JUNE 29, 1905.

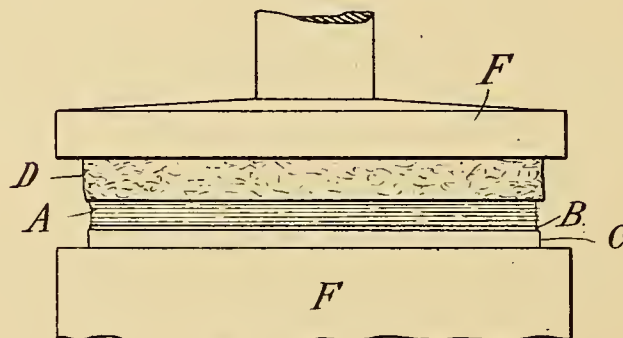
1,102,253.

Patented July 7, 1914.

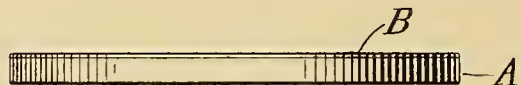
*Fig.1*



*Fig.2*



*Fig.3*



Witnesses  
*Raphael Ketter*  
*R. L. Scott*

*Victor H. Emerson,*  
*George A. Manwaring, and*  
*James K. Reynard,*  
Inventors.

By their Attorneys:  
*Mauro, Cameron, Lewis, & Masie,*

# UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., GEORGE A. MANWARING, OF BAYONNE, NEW JERSEY, AND JAMES K. REYNARD, OF NEW YORK, N. Y., ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## COMPOSITE-DISK SOUND-RECORD.

1,102,253.

Specification of Letters Patent.

Patented July 7, 1914.

Application filed June 29, 1905. Serial No. 267,598.

*To all whom it may concern:*

Be it known that we, VICTOR H. EMERSON, GEORGE A. MANWARING, and JAMES K. REYNARD, citizens of the United States, and residents of New York city, New York; Bayonne, Hudson county, New Jersey, and New York city, New York, respectively, have invented a new and useful Improvement in Composite-Disk Sound-Records, which improvement is fully set forth in the following specification.

This invention relates to sound-records impressed in disks or tablets, and more particularly to the composite tablet and the manner of building up the same, and the method of making the record.

The invention will best be understood by describing in detail the successive steps employed in producing the article.

The drawings annexed hereto, as part of the specification, are sectional views exaggerated in thickness.

Figure 1 shows a pair of rollers through which is passing a matrix and the unfinished record-tablet; Fig. 2 represents a press operating upon the same; and Fig. 3 is the finished article.

The body of our tablet is built up of alternating layers of very thin paper and a "glue," constituting what is known in the stereotyper's art as a "flog." This "glue" contains copal, starch, gluten, gum tragacanth, and alum (to prevent fermentation and to harden), and is not in itself new with us. We proceed by placing a sheet of very thin paper upon a flat surface, then apply a liberal coating of this glue, then spread over this a second sheet of paper followed by a second layer of the glue, and so on. Upon the last layer of the glue we place, instead of the ordinary thin sheet of paper, a specially prepared sheet. This latter is a thin sheet of paper coated with a suitable "paint" which is susceptible of receiving and retaining the impressions contained in the sound-record matrix, and this material must also be waterproof or water-insoluble. Preferably this "paint" consists of a solution containing celluloid and shellac with rotten stone. This solution in itself forms no part of the present invention. This solution or its equivalent is applied in one or more coats to the sheet of paper and allowed

to become dry and seasoned. The facing-paper already thus prepared is placed upon top of the "flog" above referred to, to constitute the facing of our new record-tablet.

In the drawings, A represents the "flog," made up of a plurality of very thin sheets of paper having intermediate layers of the "blue"; and B represents the facing-sheet containing upon its outer surface a coat of the "paint" above referred to. This composite tablet A B is then placed upon a suitable record-matrix C, with the facing B adjacent to the matrix-surface; a felt cloth D, about one inch thick, is laid upon the back (top) of the flog; and the whole is passed under heated rollers E. The action of the rollers serves to impress into the facing B the irregularities of the matrix-surface, and likewise forces out much of the water from the "flog." As the next step, we place the matrix and partly compressed and dried flog, as a whole, in a suitably heated press F. Thereafter, it is removed from the press and the finished record A' B is separated from the matrix. This finished article contains in the surface B a correct and permanent copy of the original sound-record from which the matrix has been obtained, and is durable and nonwarpable. It will be observed that water is the medium in which the glue is dissolved, and that neither as water nor when changed into steam will it affect the "paint" upon the facing B. During the rolling and pressing, under the heat of the rollers and press, the water is forced out in the form of steam and is partly absorbed by the felt, so as to leave the tablet A' B perfectly dry and hard. The completed article A' B will then be finished by waterproofing its back and edge. This system constitutes a radical departure in the production of sound-records: heretofore impressed sound-records have been made by treating a material which becomes soft and plastic under heat and pressure, whereas, our present system deals with a soft and plastic material which becomes hard and set under heat and pressure.

We do not limit ourselves to the precise ingredients or methods employed, having given detailed descriptions merely for the sake of clearness.



Having thus described our invention, we claim:

1. As an article of manufacture a sound-rec-  
ord consisting of a composite tablet com-  
posed of a plurality of sheets of very thin  
paper, the outer sheet having a facing of  
suitable "paint" containing celluloid and  
shellac in which the record proper, is im-  
pressed and all of said sheets united and  
impregnated with a suitable "glue."

2. As an article of manufacture, a sound-  
record consisting of a composite tablet com-  
posed of a plurality of sheets of very thin  
paper, the outer sheet having a facing of

superior sound-record material in which the  
record proper is impressed and all of said  
sheets being united and impregnated with a  
suitable glue.

In testimony whereof we have signed this  
specification in the presence of two subscrib-  
ing witnesses.

VICTOR H. EMERSON.  
GEORGE A. MANWARING.  
JAMES K. REYNARD.

Witnesses:

C. A. L. MASSIE,  
W. H. HARTING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."



H. A. GAYDON.  
SOUND PRODUCING DEVICE.  
APPLICATION FILED JULY 31, 1911.

1,102,260.

Patented July 7, 1914.

Fig. 1.

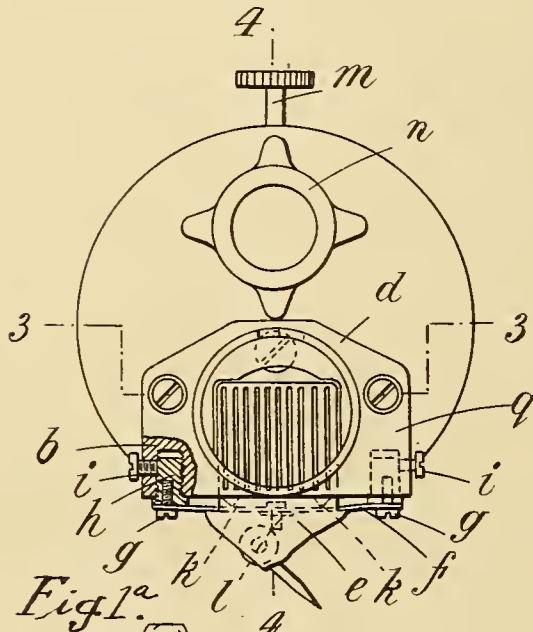


Fig. 2.

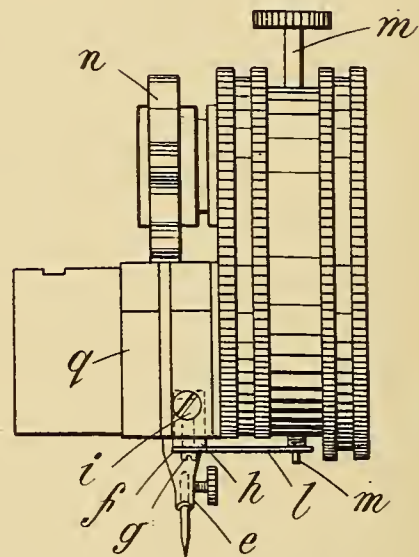


Fig. 3.

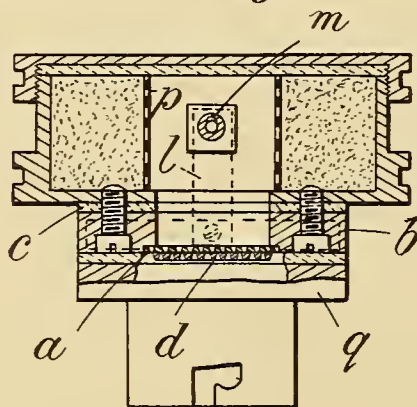
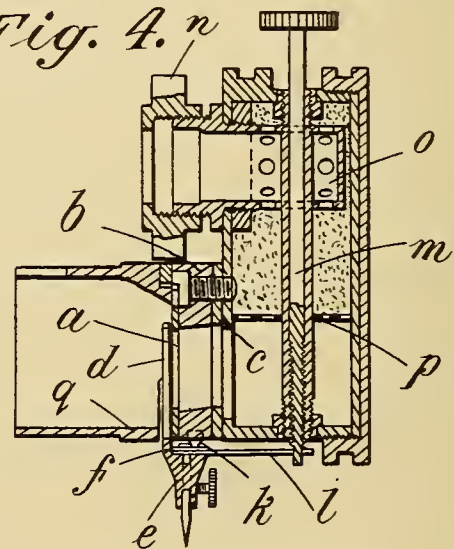


Fig. 4.



Witnesses

Wm. L. Edmonston  
E. C. Tate.

Inventor

Harry A. Gaydon  
By [Signature]

Att'y.



# UNITED STATES PATENT OFFICE.

HARRY ALFRED GAYDON, OF CROYDON, ENGLAND.

## SOUND-PRODUCING DEVICE.

1,102,260.

Specification of Letters Patent.

Patented July 7, 1914.

Application filed July 31, 1911. Serial No. 641,583.

*To all whom it may concern:*

Be it known that I, HARRY ALFRED GAYDON, a subject of His Majesty the King of England, residing at "Roselea," 44 Inglis road, Addiscombe, Croydon, in the county of Surrey, Kingdom of England, have invented certain new and useful Improvements in Sound-Producing Devices, of which the following is a specification.

My invention relates to sound producers of the kind in which a valve, consisting of a comb or grating, the teeth or bars of which are adapted to close the spaces between the teeth or bars of a like comb or grating forming the valve seat, controls passages of elastic fluid thus producing the sound. In sound producers of this kind the valve has been carried by a torsional spring support mounted at each end in bearings arranged upon the valve seat so as to be adjustable, whereby the distance of the valve from its seat may be varied. Thus the torsional spring constitutes the fulcrum of the lever consisting of the valve and the piece that holds the stylus.

By my invention I am enabled to use a lighter torsional spring by providing a separate fulcrum for the lever system comprising the valve. For this purpose the piece that holds the stylus is provided with a shoulder to which the torsional spring is fixed and takes under the block in which the valve seat is mounted; between this block and the shoulder are one or more balls or projections which serve as the said fulcrum. This construction allows of the ends of the torsional spring being mounted in pieces adjustable on the under surface of the block carrying the valve seat, thus affording a more readily accessible adjustment than that afforded when the bearings of the spring are carried on the face of the valve seat. It also provides greater flexibility in the desired direction. This construction of the piece that holds the stylus also allows of a very simple adjustment of the spring pressure on the valve which balances the elastic fluid pressure. For this purpose one end of a blade spring may be fixed to the aforesaid shoulder, and the other end may be engaged by a screw spindle extending through the sound box. Another improvement is connected with the distribution of the elastic fluid entering the sound box. For improving this distribution I partition the box with wire gauze or the like

so that there is an inner compartment on the end wall of which the valve seat is situated, and an outer compartment surrounding or substantially co-axial with the inner compartment, and packed with cotton-wool or other suitable filtering material.

The accompanying drawings illustrate the invention as applied to the sound producer of a gramophone, Figure 1 being a front elevation partly in section. Fig. 1<sup>a</sup> is a detail end view of one of the rotatable elements *h*. Fig. 2 a side elevation, and Figs. 3 and 4 sections on line 3—3 and 4—4 respectively of Fig. 1.

The valve seat *a* is mounted in a block *b* which is attached by screws to the sound box, with interposition of a rubber or like washer *c*. As shown in Fig. 3, the bars of the grating forming this valve seat are tapered in cross section, the narrowed side of the bar being turned toward the sound box. The valve *d* is also a grating, the bars of which taper in cross section in the opposite direction to the taper of the cross section of the valve seat bars. As shown in Fig. 4, the bars of the valve seat also taper upwardly. This construction of the bars of the valve and the seat is known and does not form a part of my invention. The valve is carried in known manner by the piece *e* in which the stylus is mounted, the valve being here shown as cast in one with the said piece but it obviously may be constructed in two or more pieces suitably fixed together.

To a shoulder on the piece *e* is screwed a flat spring *f* the ends of which are fixed by screws *g* to larger screws or pins *h* adapted to turn in the block *b* but to be locked therein by screws *i*. Screws *g* are eccentrically mounted in the pins *h*, so that when the latter are turned, after screws *i* have been loosened, the distance of the valve *d* from the valve seat *a* is either slightly increased or slightly decreased according to the direction of the rotation. In order to diminish the friction, so as to facilitate the lifting of the valve, the under surface of the block *b* carries two rounded projections *k* against which the piece *e* is held by the spring *f*, and which thus become the fulcrum whereon the piece *e* turns when the valve is lifted. The pressure required to lift the valve is adjusted through spring *l*, one end of which is fixed to the piece *e* while the other end is slotted to receive the



reduced end of a screw spindle *m* working in a tube extending through the sound box. In place of the rounded projections *k* I may use knife edges, points, rollers, balls or the like.

The air supply pipe is attached by the connection *n* to the short pipe *o* which extends into the sound box and may be closed at this end except that it has lateral perforations. Within the sound box, at the part thereof at which the opening for the escape of air is situated, is a gauze partition *p*. The space within the sound box around this partition is packed with suitable filtering medium, such as cotton-wool.

*q* is the piece carrying the socket which receives the horn.

What I claim as my invention and desire to secure by Letters Patent in the United States is:—

1. In a sound producer, the combination of a sound box, a block secured on said box, fulcrum elements carried by said block, a comb or grating secured on the block and forming a valve seat, rotatable elements mounted in said block, a stylus carrying member, a single flat spring secured to said stylus carrying member, rotatable elements passing through the ends of said flat spring and mounted eccentrically in the aforesaid rotatable elements whereby said stylus carrying member is held adjustably against said fulcrum elements, and a comb or grating formed on the stylus carrying member constituting a valve for coöperation with the valve seat on the block to control the passage of elastic fluid producing the sound.

2. In a sound producer, the combination of a sound box, a block secured on said box, fulcrum elements carried by said block, a comb or grating secured on the block and forming a valve seat, rotatable elements mounted in said block, a stylus carrying member provided with a shoulder, a flat spring secured on the shoulder of the carrying member, rotatable elements passing through the flat spring and mounted eccentrically in the aforesaid rotatable elements whereby said stylus carrying member is held adjustably against said fulcrum elements, means for locking said first mentioned rotatable elements in the block, a comb or grating formed on the stylus carrying member and

constituting a valve, a second spring secured on the stylus carrying member, and means operatively connected to one end of said second spring to adjust the valve in relation to the valve seat.

3. In a sound producer, the combination of a sound box, a block secured on said box, fulcrum elements carried by said box, a comb or grating secured to the block and forming a valve seat, rotatable elements mounted in the block, a stylus carrying member provided with a shoulder, a spring secured to said shoulder, rotatable elements passing through the ends of said spring and mounted eccentrically in the aforesaid rotatable elements, set screws for locking the first-mentioned rotatable elements in the block, a comb or grating formed on the stylus carrying member and constituting a valve, a second spring secured at one of its ends on the shoulder of the stylus carrying member and at its opposite end provided with a slot, and a screw spindle mounted in and extending through the sound box and having a reduced end in engagement with the slotted end of said second-mentioned spring whereby the valve may be adjusted relative to the valve seat.

4. In a sound producer, the combination of a sound box, a block secured on said box, fulcrum elements carried by said block, a comb or grating secured on the block and forming a valve seat, rotatable elements mounted in the block, a stylus carrying member, a spring secured intermediate its ends to said stylus carrying member, rotatable elements passing through the ends of said spring and mounted eccentrically in the first mentioned rotatable elements, a comb or grating formed on the stylus carrying member and constituting a valve, a laterally perforated pipe in the sound box for the admission of the elastic fluid, and wire gauze and filtering material interposed between said pipe and the valve seat.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses this 18th day of July, 1911.

HARRY ALFRED GAYDON.

Witnesses:

C. H. ROLLISON,  
J. S. WITHERS.





S. D. PADDACK.  
 REPRODUCER FOR PHONOGRAPHS.  
 APPLICATION FILED JUNE 16, 1913.

1,102,290.

Patented July 7, 1914.

Fig. 1.

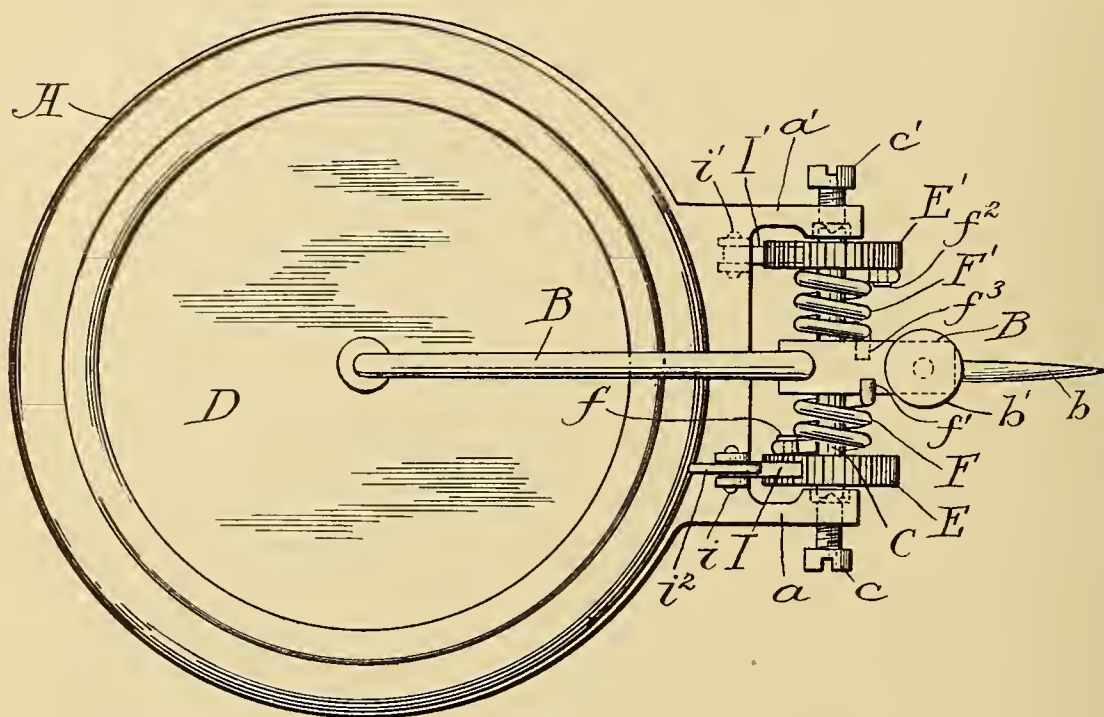
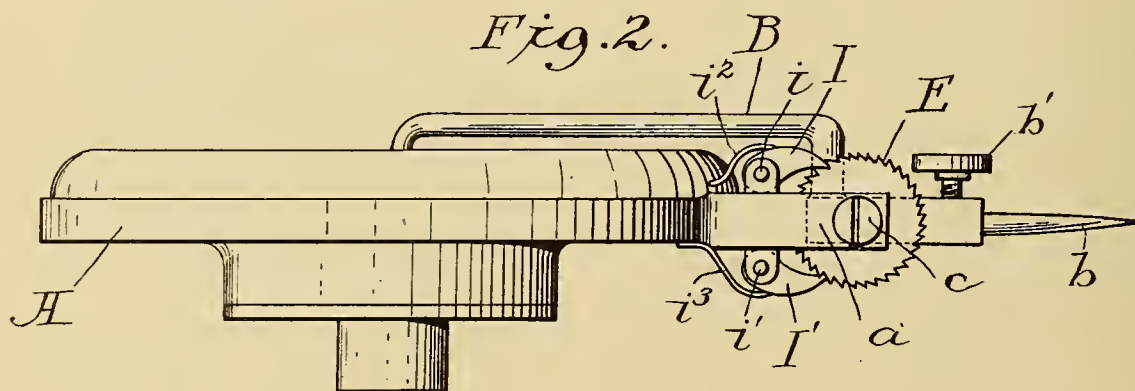


Fig. 2.



WITNESSES:

*Cornelius Gabruskie*  
*F. S. Fitzsimons*

INVENTOR

*Simon D. Paddack.*

BY

*Griffith Bernhard*

Attorneys

# UNITED STATES PATENT OFFICE.

SIMON D. PADDACK, OF NEW YORK, N. Y.

REPRODUCER FOR PHONOGRAPHS.

1,102,290.

Specification of Letters Patent.

Patented July 7, 1914.

Application filed June 16, 1913. Serial No. 774,051.

*To all whom it may concern:*

Be it known that I, SIMON D. PADDACK, a citizen of the United States, residing in the city of New York, borough of Manhattan, county and State of New York, have invented a certain new and useful Reproducer for Phonographs, of which the following is a specification.

This invention pertains to reproducers for phonographs, and relates, more particularly, to improvements whereby the diaphragm is maintained in such operative state as to insure, at all times, its most efficient action in quickly and perfectly responding to the movements of the stylus as it traverses the record.

Speaking generally, the improvement consists in so balancing the stylus or tone bar that the diaphragm is free to quickly and accurately respond to the most minute movements of the stylus. This result is accomplished by associating with the stylus bar and its supporting spindle, two complementary springs, one of which exerts tension on the stylus bar and thus applies pressure to the diaphragm in one direction, while the other exerts an opposed tension on the stylus bar and a consequent pressure on the diaphragm in an opposite direction to that produced by the first spring. In the preferred construction, suitable means is provided for varying the tension on the said springs, and it will thus be obvious that they can be so adjusted that the diaphragm is placed under such tension as to produce sounds of the purest and best quality, and yet be so sensitive as to reproduce the most delicate and softest tones.

In the accompanying drawings, I have illustrated one practical embodiment of the invention, but the construction shown therein is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a plan view of a phonograph reproducer embodying the present invention; and Fig. 2 is a side elevation thereof.

Referring to said drawings, A denotes a sound box of a phonograph reproducer. At one side of said sound box are a pair of laterally extending arms *a*, *a'*, between which the stylus bar B, of the reproducer, is mounted, on a spindle C, the ends of which are engaged by oppositely placed aligned screws *c*, *c'*, threaded through the arms *a*, *a'*. For precluding lateral movement of said

bar on the spindle, I preferably, fixedly secure the bar B to said spindle C, though, manifestly, this might be accomplished in various ways. Thus pivoted intermediate its length, the stylus bar extends in one direction inward over the sound box A, and is secured in any desired manner to the diaphragm D, and at its opposite free end provision is made for the reception of the stylus *b*, which may be retained in place by the thumb screw *b'*. The stylus bar B is thus mounted for free axial movement and, if the stylus were operated on by a revolving record, vibrations would be transmitted to the diaphragm and sounds produced. I have found, however, through research into this art, that instruments embodying this free movement do not produce results which are entirely satisfactory. This is largely due to the fact that the weight of the stylus bar and the pressure due to the engagement between the stylus and the record cause the diaphragm to bulge, which bulge, however slight, greatly interferes with the proper operation thereof.

In order to obtain the best results from a vibrating diaphragm, it is necessary that said diaphragm lie, when in its normal state of quietude, in a plane. Realizing this, I have, by the present invention, provided means whereby the aforesaid difficulties are obviated by so balancing the stylus bar B that the diaphragm is free to normally assume its correct position. Moreover, said balancing means is extremely simple in construction and is, at the same time, capable of such fine adjustment that it will not interfere with the reproduction of the most delicate tones, but, rather, tend to stimulate them. Revolvably mounted on the spindle C, at either side of the stylus bar B, are a pair of ratchet wheels E, E', and intermediate said wheels and bar a pair of helical springs F, F', encircle said spindle. The spring F is secured at one end of its ends to the pin *f*, on the wheel E, and its other end is bent over, as at *f'*, so as to engage the upper face of the stylus bar. The spring F' is secured at one end to the pin *f'* on the wheel E', and its other end is bent over, as at *f''*, so as to engage the lower face of said bar. Dogs I, I', pivoted on the sound box by the pins *i*, *i'*, are positioned for co-operation with the ratchet wheels E, E', respectively, being so situated that they operate oppositely on said wheels. Leaf springs



$i^2$ ,  $i^3$ , exert pressure on the dogs I, I', to normally retain them in engagement with said ratchet wheels. It will thus be obvious that, by rotating the wheels E, E', in counter directions, the springs F, F', may be put under opposed tension, and that, by the proper manipulation of these wheels, the tension on said springs may be so regulated as to perfectly balance the stylus bar.

10 An instrument embodying the present invention is found to produce tones of the highest quality and those rapid, jerky, and irregular sounds sometimes distinguishable in phonographs are not prevalent. This is  
15 due to the fact that the stylus bar is, at all times, under the influence of one or the other of the springs with the result that even tones or sounds are assured.

In the foregoing description, the reproducer is set forth in what has been thus far found to be the best form, though, doubtless, changes, within the capacity of those skilled in the art, will be made from time to time. Manifestly, therefore, I do not wish  
25 to be understood as limiting myself to the specific structure shown, or to any greater extent than the state of the art may require.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a reproducer for phonographs, or the like, the combination of a sound box, a spindle mounted in coöperative relation thereto, a stylus bar pivoted on said spindle, and helical springs positioned coaxially  
35 with the spindle and coöperating with the stylus bar whereby said bar may be balanced on its axis of oscillation.

2. In a reproducer for phonographs, or the like, the combination of a sound box, a spindle mounted in coöperative relation thereto, a stylus bar pivoted on said spindle, helical springs positioned coaxially with the spindle and coöperating with the stylus  
45 bar, and means coöperating with said springs for placing them under opposed tension whereby said bar may be balanced on its axis of oscillation.

3. In a reproducer for phonographs, or the like, the combination of a sound box, a spindle mounted in coöperative relation thereto, a stylus bar pivoted on said spindle, helical springs positioned coaxially with the spindle and coöperating with the  
55 stylus bar, adjusting means coöperating with said springs for placing them under opposed tension whereby said bar may be balanced on the spindle, and means for locking said controlling means against inadvertent movement.

4. In a reproducer for phonographs, or the like, the combination of a sound box,

a spindle mounted thereon, a stylus bar carried by said spindle, helical springs positioned coaxially with the spindle and secured to the stylus bar at their ends adjacent to said bar, adjusting means mounted on the spindle and coöperating with the opposite ends of said springs for placing them under opposed tensions, and means independent of said spindle and coöperable with the adjusting means, whereby said adjusting means may be locked against inadvertent movement.

5. In a reproducer for phonographs, or the like, the combination of a sound box, a spindle mounted thereon, a stylus bar carried by said spindle, helical springs positioned coaxially with the spindle and secured to the stylus bar at their ends adjacent to said bar, adjusting means rotatably mounted on the spindle and coöperating with the opposite ends of said springs for placing them under opposed tensions, and means independent of said spindle and coöperable with the adjusting means, whereby said adjusting means is automatically locked against inadvertent rotation.

6. In a reproducer for phonographs, the combination of a sound box, a spindle mounted on said sound box, a stylus bar pivoted on said spindle at substantially the center thereof, rotatable members mounted on said spindle, helical springs coöperating with the stylus bar and the rotatable members whereby the rotation of said members in opposite directions serves to place the springs under tension, and means whereby inadvertent movement of said rotatable members is precluded.

7. In a reproducer for phonographs, the combination of a sound box, a spindle mounted on said sound box, a stylus bar pivoted on said spindle at substantially the center thereof, ratchet wheels rotatably mounted on said spindle, at either side of the stylus bar, helical springs encircling said spindle and having their opposite ends attached to the stylus bar and to the ratchet wheels, whereby the turning of said wheels in opposite directions serves to place the springs under opposed tensions, and dogs coöperating with said ratchet wheels for the purpose of maintaining the springs under such relative tension that the stylus bar will be perfectly balanced.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON D. PADDACK.

Witnesses:

CORNELIUS ZABRISKIE,  
M. C. RODRIGUEZ.

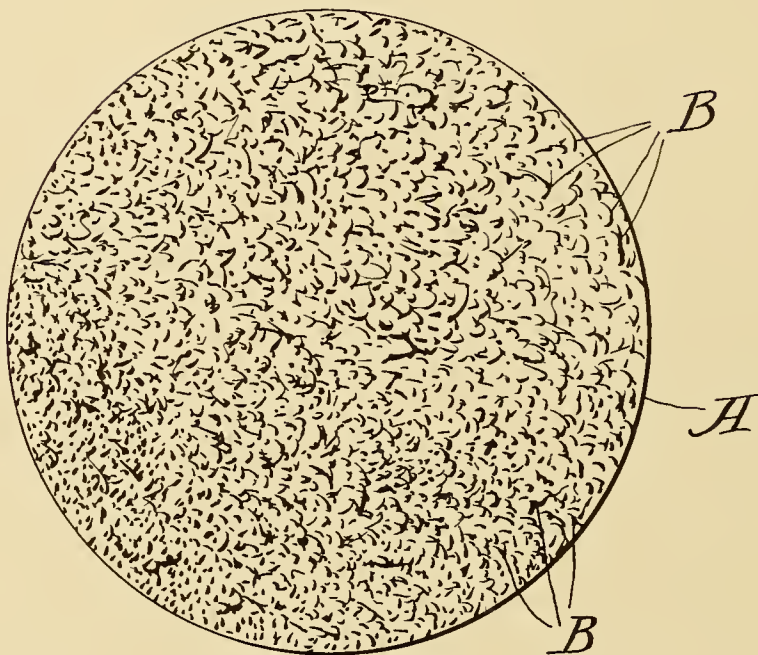




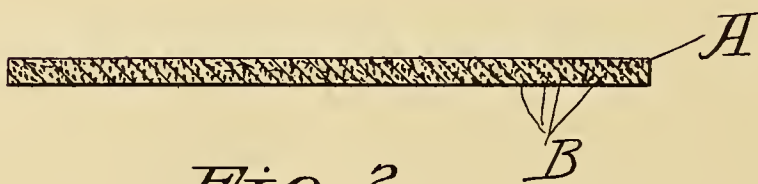
S. D. PADDACK.  
SOUND PRODUCING DIAPHRAGM.  
APPLICATION FILED JUNE 16, 1913.

1,102,291.

Patented July 7, 1914.



*Fig. 1.*



*Fig. 2.*

WITNESSES:

*Cornelius Gabriskie*

*J. S. Fitzsimons.*

INVENTOR

*Simon D. Paddack.*

BY

*Griffin Bernhard*  
Attorneys

# UNITED STATES PATENT OFFICE.

SIMON D. PADDACK, OF NEW YORK, N. Y.

## SOUND-PRODUCING DIAPHRAGM.

1,102,291.

Specification of Letters Patent.

Patented July 7, 1914.

Application filed June 16, 1913. Serial No. 774,052.

*To all whom it may concern:*

Be it known that I, SIMON D. PADDACK, a citizen of the United States, residing in the city of New York, borough of Manhattan, county and State of New York, have invented a certain new and useful Sound-Producing Diaphragm, of which the following is a specification.

This invention pertains to sound producing diaphragms, particularly adapted for use in phonographs, and embodies the diaphragm as a new article of manufacture.

The object of the invention is the production of a diaphragm which emits clear, pure, and resonant tones, in contradistinction to the diaphragms now in use which produce tones of a more or less raspy or metallic character.

With the foregoing object in view, the invention embodies a suitable base member, preferably blotting paper, which has been rendered hard and given vibratory qualities by means of a certain chemical treatment.

The following detailed description of the manner of making the diaphragm is what I now consider the best method, but it will be understood that this is not the exclusive one, for, in all probability, other agents, more or less equivalent to those specified, may be employed to secure some or all of the advantages of my invention.

I preferably start with a piece of blotting paper of the desired size, and dip it in a suitable volatile agent or menstruum, preferably ordinary ether, although I may use, though not with the same advantage, alcohol and benzol. The blotting paper having been treated as described, I immerse it, while saturated with the solvent, in a molten mixture consisting, preferably, of Japan wax, resin, and fish glue. The proportions of the ingredients entering into this mixture may be varied within considerable limits. but the proportions, by weight, which I have found to give the best results, are substantially as follows:—Japan wax 20%, resin 60%, fish glue 20%. The ingredients are mixed together and simply heated, preferably over a water bath, to a sufficient degree to melt them and produce a homogeneous mixture. The blotting paper, or other base material for the diaphragm, having been immersed in the mixture, is withdrawn and allowed to cool, whereupon there results a

hard, water-proof, sonorous disk, particularly adapted for the purposes specified.

In the accompanying drawing is illustrated a sound-producing diaphragm embodying my invention, wherein—

Figure 1 is a face view of the diaphragm embodying my invention, and Fig. 2 is a cross section through the center thereof.

Referring to the drawings, A designates the base member, preferably embodying blotting paper, and B the composition of waxy material.

I have found I can substitute for the Japan wax in the foregoing mixture, beeswax, carnauba wax, or paraffin wax, and, doubtless, some of the numerous other waxes on the market may be used. I prefer, however, to use the Japan wax. For the fish glue specified, I may substitute gelatin, collagen, or equivalent material. The gelatin may be dispensed with, in whole or in part, and yet some of the advantages of my invention be retained in the mixture of wax and resin. I prefer, however, to use the gelatin, or its equivalent, in the manner specified.

The function of the ether, or other volatile agent, appears to be that of opening up, or loosening the pores or fibers of the base material, thereby rendering it more susceptible to the subsequent treatment. In other words, by opening the pores of the base material, the waxy mixture more readily adheres thereto, or is more easily taken up thereby. In some cases I have used softening agents, less volatile than those mentioned, though not with as good results.

When blotting paper is employed as the base of the diaphragm, treated in the manner described, it will be manifest that said blotting paper so absorbs the waxy mixture as to become saturated and coated therewith, although it will be understood that other base materials, less absorbent than blotting paper, may be employed. I have found, however, that blotting paper gives very superior results.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. As a new article of manufacture, a sound producing diaphragm consisting of a suitable base having waxy material and a hardening agent for the waxy material incorporated therein.



2. As a new article of manufacture, a sound producing diaphragm consisting of a suitable non-metallic base having waxy material and a hardening agent for the waxy material incorporated therein.

3. As a new article of manufacture, a sound producing diaphragm consisting of blotting paper having waxy material and a hardening agent for the waxy material incorporated therein.

4. As a new article of manufacture, a sound producing diaphragm consisting of a suitable base to which has been applied a composition containing wax and resin.

5. As a new article of manufacture, a sound producing diaphragm consisting of a suitable base to which has been applied a composition containing wax, resin and glue.

6. As a new article of manufacture, a

sound producing diaphragm consisting of blotting paper to which has been applied a mixture containing wax and resin.

7. As a new article of manufacture, a sound producing diaphragm consisting of blotting paper to which has been applied a mixture of wax, resin and glue.

8. As a new article of manufacture, a sound producing diaphragm consisting of a base of absorbent nature and having its pores filled with a waxy material containing a hardening agent which renders it hard and sonorous.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON D. PADDACK.

Witnesses:

M. C. RODRIGUEZ,

F. S. FITZSIMONS.

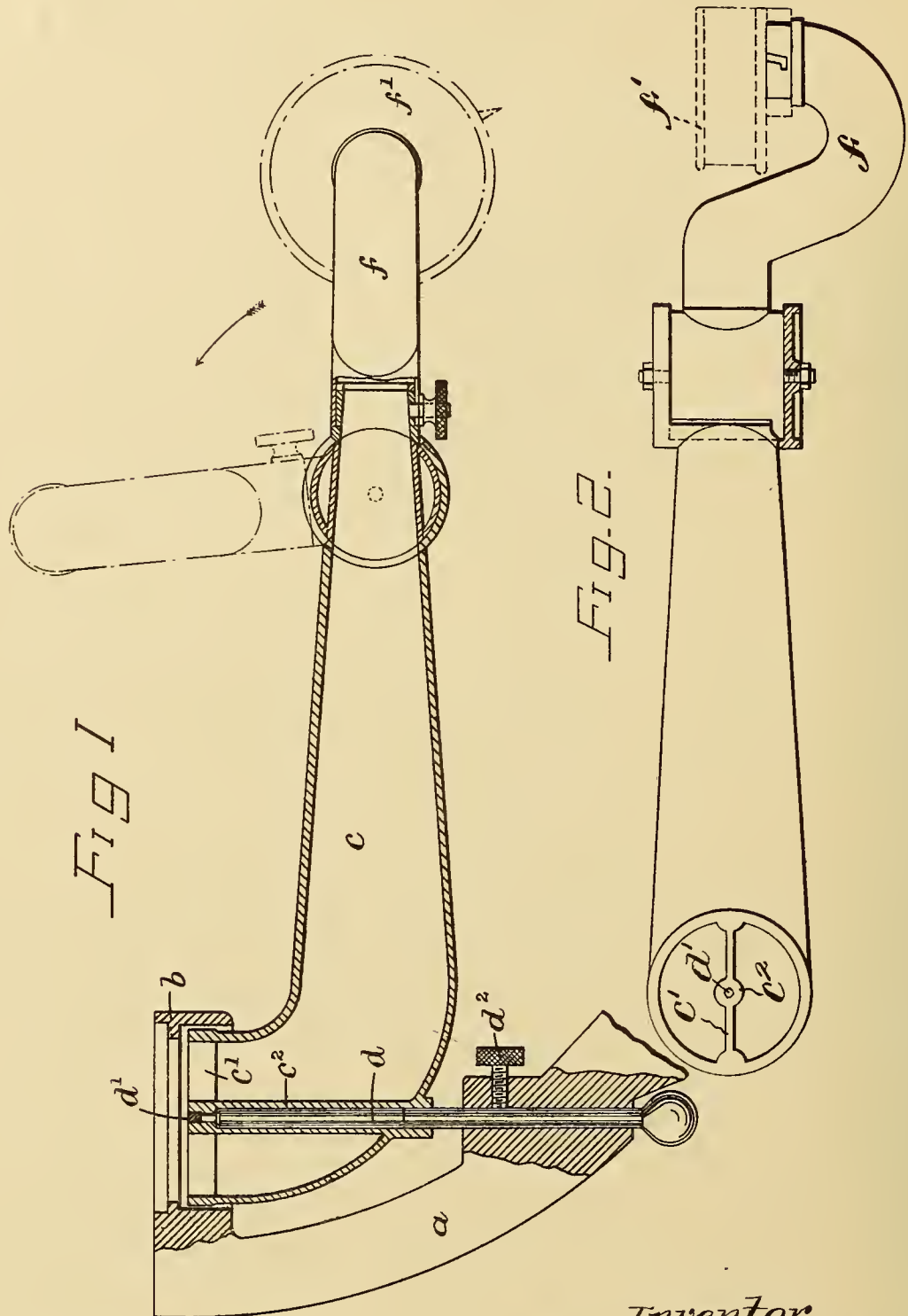
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



H. G. WIEDER.  
SOUND REPRODUCING AND RECORDING INSTRUMENT.  
APPLICATION FILED SEPT. 11, 1912.

1,102,839.

Patented July 7, 1914.



Witnesses  
H. W. Pimm  
Owen W. Holmes

Inventor  
Henry George Wieder  
by Wilbur J. Witherspoon  
Mackay  
his Attorneys.



# UNITED STATES PATENT OFFICE.

HENRY GEORGE WIEDER, OF LONDON, ENGLAND.

SOUND REPRODUCING AND RECORDING INSTRUMENT.

1,102,839.

Specification of Letters Patent.

Patented July 7, 1914.

Application filed September 11, 1912. Serial No. 719,854.

*To all whom it may concern:*

Be it known that I, HENRY GEORGE WIEDER, a subject of the Emperor of Austria-Hungary, residing at 50 and 51 High Holborn, in the county of London, Middlesex, England, have invented a new and useful Improvement Relating to Sound Reproducing and Recording Instruments, of which the following is a specification.

My invention relates to improvements in sound reproducing and recording instruments such as gramophones, phonographs, and the like.

One object of my invention is an improved means of attachment for the arm carrying the sound box or reproducer by which the arm is adjustable more or less vertically while it is carried in such a way that it can swing with a minimum of friction to the movement of the needle or sapphire upon the record.

The accompanying drawings are illustrative of my improved means of attaching the tone arm to its bracket, Figure 1 being a longitudinal section and Fig. 2 a plan view showing the improved method of attachment as applied to a tone arm which is disposed beneath the trumpet.

In carrying out my invention I provide the elbow or bracket *a*, which supports the trumpet, with a collar or ring *b* which receives the elbow of the tone arm *c* and which is of sufficient depth to allow the tone arm to be raised or lowered therein for vertical adjustment. Across the open end of the elbow of the tone arm I fix a horizontal bar or carrier *c'* furnished centrally with an inwardly extending vertical tube *c<sup>2</sup>* adapted to receive a spindle *d* one end of which terminates in a point fitting a bearing *d'* threaded in the bar or carrier *c'*. The spindle *d* passes through the wall of the tone arm *c* and through a corresponding aperture in the bracket *a*, in the latter of

which it is held in its adjusted position by means of a set screw *d<sup>2</sup>*. To reduce the frictional contact to a minimum, I preferably reduce the diameter of the spindle *d*, as shown, for the major portion of that length thereof which is contained in the tube *c<sup>2</sup>*. The weight of the tone arm *c* is thus carried by the spindle *d* which not only permits vertical adjustment of the tone arm to be effected but enables the said arm to swing freely so as to follow the track of the record while its trumpet end is retained in the collar *b*. The tone arm *c* carries at its outer free end any usual form of neck *f*, to which a sound box *f'* may be attached.

I have illustrated and described preferred and satisfactory constructions but obviously changes could be made within the scope of the appended claim.

What I claim as my invention and desire to secure by Letters Patent is:—

In sound reproducing machines the combination with a supporting arm provided with a trumpet-carrying ring having an interior flange intermediate the ends thereof, of a tone arm having one end formed with an elbow fitted for vertical adjustment in said ring below the flange, an openended tube passing through the wall of said tone arm vertically and centrally with the opening in said elbow and terminating flush with the end of the tone arm, a pointed spindle adjustably mounted in said supporting arm and fitting said tube, and a removable bearing threaded in the upper end of said tube and receiving the pointed end of said spindle.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

HENRY GEORGE WIEDER.

Witnesses:

ARTHUR E. EDWARDS,  
ED. H. ELBOB.





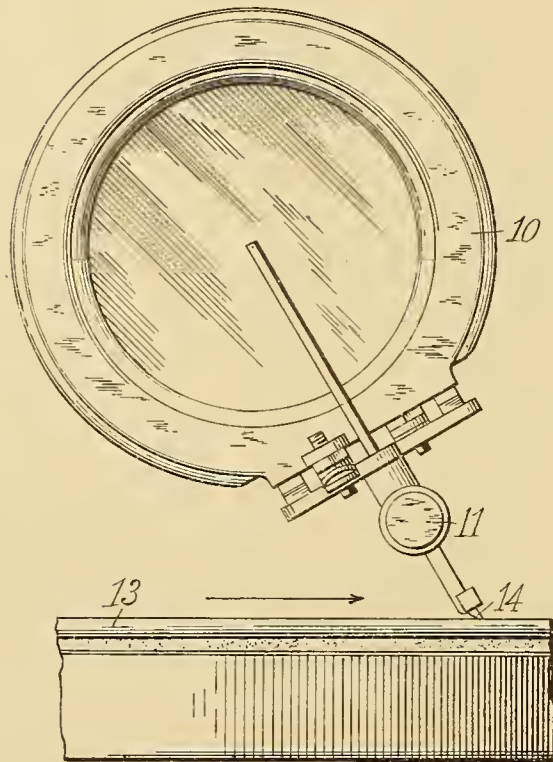


G. LEHR.  
 STYLUS FOR SOUND REPRODUCING MACHINES.  
 APPLICATION FILED MAR. 8, 1913.

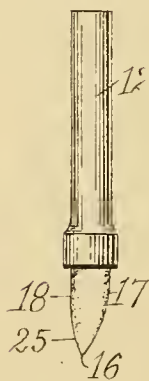
1,103,592.

Patented July 14, 1914.

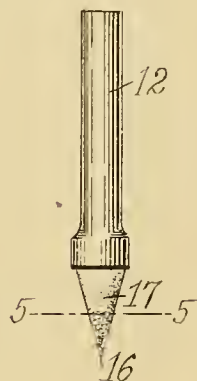
*Fig. 1*



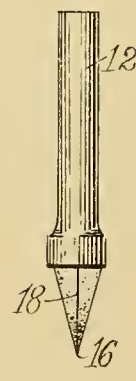
*Fig. 2*



*Fig. 3*



*Fig. 4*



*Fig. 5*



Witnesses:  
 John Murtagh  
 W. F. Hogg

Inventor  
 Gustave Lehr.  
 By his Attorneys  
 Louis G. Goepp

# UNITED STATES PATENT OFFICE.

GUSTAVE LEHR, OF NEW YORK, N. Y.

STYLUS FOR SOUND-REPRODUCING MACHINES.

1,103,592.

Specification of Letters Patent.

Patented July 14, 1914.

Application filed March 8, 1913. Serial No. 752,840.

*To all whom it may concern:*

Be it known that I, GUSTAVE LEHR, a citizen of the United States, residing in New York, borough of Brooklyn, in the State of New York, have invented certain new and useful Improvements in Styli for Sound-Reproducing Machines, of which the following is a specification.

The object of this invention is to furnish for sound-reproducing machines, a stylus which is durable in use, not prohibitive in cost, and which yields a superior tone. These objects are attained by making the record-engaging portion of the styli of ruby, and forming the same in generally pyramidal form, with a curved face.

In the accompanying drawing, Figure 1 is a side-view of a portion of a gramophone disk, and a front view of the reproducer of the instrument, showing in position of use a stylus embodying the invention. Fig. 2 is an enlarged side elevation of the stylus removed from the machine, Fig. 3 is a view on a similar enlarged scale, taken from the rear of the stylus, Fig. 4 is a front-elevation on the same enlarged scale, and Fig. 5 is a horizontal section on line 5—5 of Fig. 3 through the jewel forming the working point of the stylus.

Similar numerals of reference indicate corresponding parts in all the figures.

The reproducer sound-box 10 and frame are of any usual type, having a socket 11 adapted to receive the metal shank 12 of the stylus and support the stylus in position against the record 13, which is rotated in direction of the arrow in Fig. 1.

The stylus point 14 is of ruby, and of pyramidal shape, and has one side 17 convexly curved. The edge portion 18 opposite to the curved portion 17 is convexly rounded off near the tip 16, as indicated at 25. Hence by this curved portion 25 formed into a curved wedge portion this part of the stylus may adapt itself very closely to the slightest variations in the grooves of the record. Thus by the pyramidal device with the curved upper portion a wedge-shaped stylus is produced which has the lowermost portion of the wedge-shaped part rounded off or curved whereby it may readily enter the grooves of the record.

I claim:

1. A stylus for sound-reproducing machines, comprising a shank, and a point therein of triangular pyramidal shape, with one side laterally and longitudinally convexly curved and the edge opposite said curved side also convexly curved.

2. A stylus for sound-reproducing machines, comprising a shank, and a point therein of triangular pyramidal shape with two adjacent plane sides, and with the intermediate side laterally and longitudinally convexly curved, and the edge opposite said curved side convexly curved near the tip of the device.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

GUSTAVE LEHR.

Witnesses:

JOHN MURTAGH,  
F. HOGG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





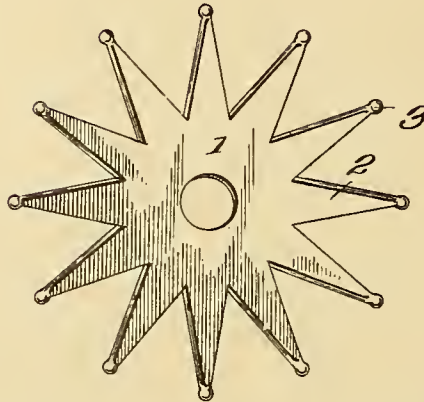


M. A. POSSONS.  
GRAMOPHONE NEEDLE OR STYLUS.  
APPLICATION FILED DEC. 16, 1913.

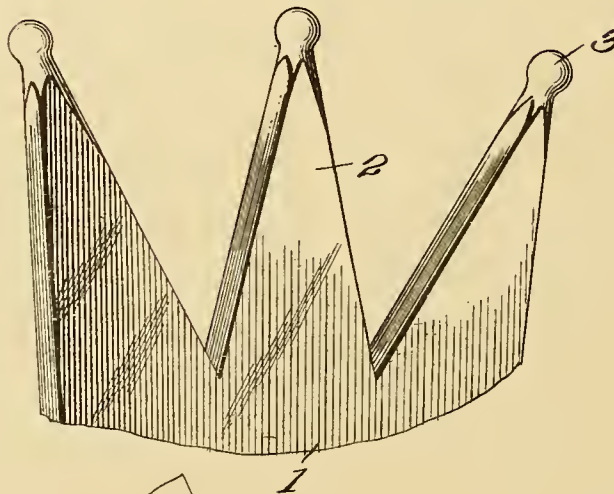
1,103,829.

Patented July 14, 1914.

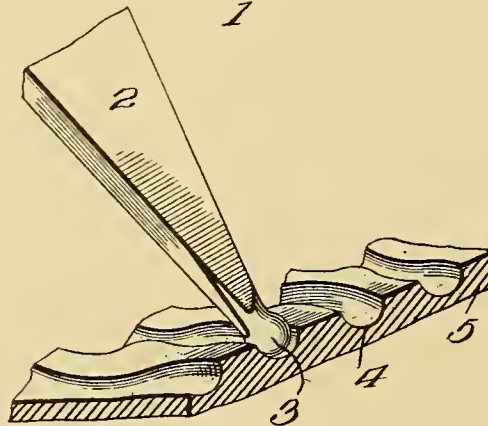
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses

*Floyd R. Cornwall*  
*E. P. Wright, Jr.*

Inventor

*M. A. Possons*

By

*A. S. Patterson*

Attorney

# UNITED STATES PATENT OFFICE.

MINARD A. POSSONS, OF CLEVELAND, OHIO.

GRAMOPHONE NEEDLE OR STYLUS.

1,103,829.

Specification of Letters Patent.

Patented July 14, 1914.

Application filed December 16, 1913. Serial No. 807,074.

*To all whom it may concern:*

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in a Gramophone Needle or Stylus, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in gramophone needle or stylus.

The object of my invention is to provide a needle or stylus for a gramophone which can be made of a very thin sheet of metal and yet have the stability to support the reproducer.

Another object of my invention is to provide a needle of this character in which the thickening of the supporting point not only strengthens the needle for supporting the reproducer but also forms a round surface adapted to fill the sound grooves of the records which does away with the grinding sound usually caused by the ordinary pointed needle or stylus and also prevents any injury to the record.

A still further object of my invention is to provide a needle of cheaper construction in that there is a great saving of material and at the same time having the necessary strength and flexibility.

In the accompanying drawing—Figure 1 is a perspective view of a star needle embodying my invention. Fig. 2 is an enlarged perspective view of a portion of the star showing more fully the rounded elliptical members carried by the ends of the points of the star. Fig. 3 is a vertical enlarged sectional view of a record showing the needle in perspective in its position in the sound grooves.

In needles or styli for gramophones it has been found necessary to make the same of metal of such thickness and to form a blunt point in order to retain sufficient area at the point to support the reproducer. By providing the point of the needle with a rounded elliptical shaped member it has been found that the needles can be made of a sheet of metal four and one half thousandths

of an inch thick which has heretofore been found to be far too thin to support the reproducer without injury to the record.

Referring now to the drawing 1 represents my improved star needle which is made of very thin metal of a thickness heretofore stated and provided with the points or needles 2, which may be of any desired number as this forms no part of the invention. These points as shown are of a tapering form and carry at their outer ends the rounded elliptical members 3 which are preferably formed integral with the needles. These members as shown in Fig. 3 are of a width equal to that of the sound grooves of the record 5 and are of a length greater than the depth of the sound grooves 4 whereby there will be no scratching of the needle in the sound grooves of the record.

The rounded elliptical portions carried by the ends of the needles give the necessary area to the point to support the reproducer yet giving the necessary resiliency to the needle above the same.

While I have shown and described the needle in the form of a star, it will be understood that the same could be made in the ordinary single form without departing from my invention.

I claim—

1. A gramophone needle, comprising a sheet of thin metal having an enlarged rounded member on its outer end.

2. A gramophone needle, comprising a sheet of thin metal tapering and having an enlarged rounded member on its outer end.

3. A gramophone needle, comprising a sheet of thin metal having an enlarged rounded member formed integral therewith on its outer end.

4. A gramophone needle comprising a sheet of thin metal having an elliptical member on its outer end.

5. A gramophone needle comprising a sheet of thin metal having an elliptical member formed integral therewith on its outer end.

6. A gramophone needle comprising a sheet of thin tapering metal having an elliptical-shaped member formed on its outer



end of a greater diameter than the thickness of the sheet of metal for the purpose described.

5 7. A gramophone needle comprising a sheet of thin tapering metal having an elliptical-shaped member on its outer end and integral therewith, and of a diameter greater than the thickness of the sheet of metal.

10 8. A gramophone needle comprising a star-shaped sheet of thin metal, the points

of which have elliptical-shaped members formed thereon and integral therewith and of a diameter greater than the thickness of the sheet of metal. 15

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

MINARD A. POSSONS.

Witnesses:

F. T. BATCHELOR,

E. A. SCHNEIDER.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



1,104,182.

Patented July 21, 1914.

Fig. 1.

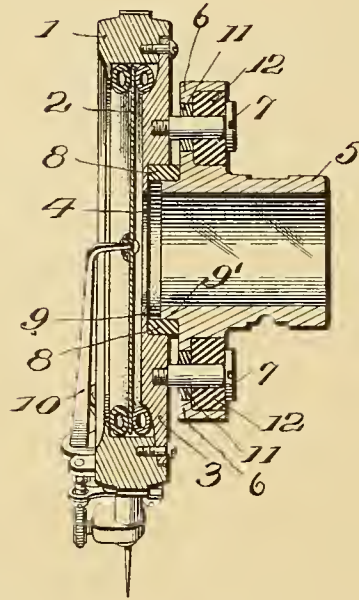


Fig. 2.

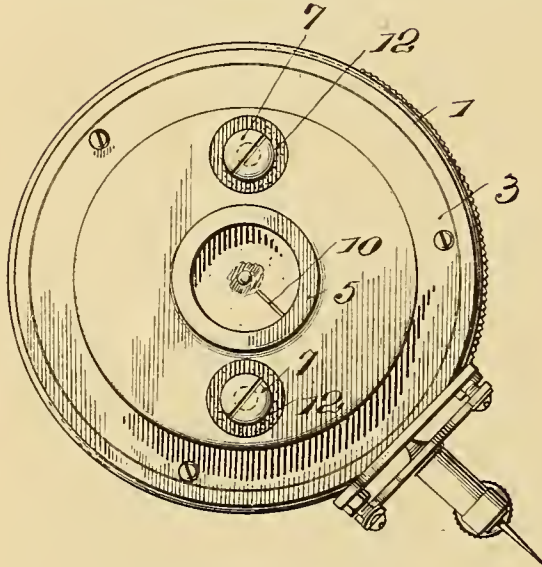
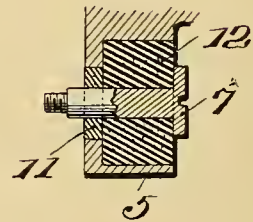


Fig. 3.



Inventor

George Lansing Funnell.

Witnesses  
James H. Anderson.  
Arch C. Fitzhugh.

By  
Maurice Cameron, Lewis Massie  
Attorneys



# UNITED STATES PATENT OFFICE.

GEORGE LANSING FUNNELL, OF LONDON, ENGLAND, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-BOX.

1,104,182.

Specification of Letters Patent.

Patented July 21, 1914.

Application filed June 9, 1913. Serial No. 772,612.

*To all whom it may concern:*

Be it known that I, GEORGE L. FUNNELL, of London, England, have invented a new and useful Improvement in Sound-Boxes, which invention is fully set forth in the following specification.

This invention relates to sound boxes, and has for its object to produce a sound box, in which the diaphragm casing proper shall be yieldingly connected to its support, such as the hub or neck of the sound box, the union being effected through the medium of a resilient joint which leaves the diaphragm casing free to have a limited movement with relation to the hub or neck.

In reproducing from certain sound records of the zig-zag type, and particularly those records of sounds having great amplitude of vibration, it is a recognized fact in the art that the strain upon the diaphragm is decreased, and the pleasing character, quality and definition of the reproduced sounds is much enhanced by providing a yielding connection between the sound box casing and its support, the yielding connection being preferably situated at the joint between the casing and the neck or hub of the sound box.

The object of the present invention is to provide an improved form of yielding resilient joint between the sound box and its support, thereby obviating the production of a harsh metallic sound by the instrument and improving the reproduction as to volume, tone, quality and definition.

The objects of the invention are accomplished, in the present instance, by forming the diaphragm casing preferably of metal, with the diaphragm mounted therein in any suitable manner, and preferably the back of the casing is closed by a metal plate having a central opening therethrough, and the hollow hub or neck is secured to this metal back by any suitable means, such as screws located on a line passing diametrically through the hub. To effect this, the hub is provided with a flange and the screws are passed through the flange and into the metal back of the diaphragm casing, and there is interposed between the hub and the back of the casing a narrow ring of any suitable resilient material, such as rubber, the thickness of the ring being such as to prevent the flange of the hub from contacting with the back of the casing, the ring

serving to form a yielding, resilient connection between the casing and the hub. As thus constructed, the diaphragm casing is free to rock on the resilient ring without imparting corresponding motion to the hub, vibrations imparted to the casing are not transmitted to the hub, and vice versa, and at the same time a complete closure is formed at the joint between the hub and the casing.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only, and are not designed to define the limits of the invention, reference being had to the claims for this purpose.

In the drawings:—Figure 1 is a central sectional view illustrating one form of my invention; Fig. 2 is a side elevation thereof; and Fig. 3 is a detail.

Referring to the drawings, in which like numerals are applied to like parts, 1 is the diaphragm casing of any suitable or usual construction and preferably of metal; 2 is any suitable diaphragm mounted in the casing; and 3 is the back of the casing composed of any suitable material, preferably metal, said back having a central opening 4 formed therethrough. A hollow hub or neck 5, preferably of metal and having a flange 6, is secured to the back of the casing by any suitable means, such as the two screws 7, 7. Interposed between the back 3 and the hollow hub or neck 5 is a ring 8 of resilient material, preferably soft rubber. This ring is quite narrow and is preferably seated in a countersink 9 formed in the back 3 surrounding the opening 4, and the hub 5 rests upon the narrow ring 8, preferably projecting slightly thereinto, as indicated at 9'. The needle arm 10 is secured to the casing 1 and to the diaphragm 2 in the usual or any suitable manner, and the devices (such as the screws 7, 7) for securing the flange 6 to the back 3 are located on a line passing diametrically through the hollow hub or neck 5, which diameter lies outside of a diametrical plane passing through the needle arm, and said screws 7, 7, are insulated from the flange 6 by any suitable means for preventing the transmission of vibra-



tions, such, for example, as slightly vulcanized rubber washers 11, 11. The flange 6 is preferably provided with countersinks, in which are located soft rubber washers 12, 12, through which the screws 7 pass. The narrow rubber ring 8 seated in the countersink 9 projects sufficiently beyond the outer surface of the back 3 to prevent the flange 6 from contacting with said back, when the screws 7 are driven home to connect the parts, thus leaving a clear space between the under side of the flange and the outer side of the back 3.

The very narrow surface of the ring 8 bearing on the hub and the resilient character of this ring form an extremely sensitive connection between the hub and diaphragm casing, and the soft rubber washers 12, 12, also yield readily, so that the entire connection between the hub and the casing is extremely sensitive and permits the casing to yield or have movement relatively to the hub, thereby avoiding any undue strain on the diaphragm through the action of records of great amplitude, and giving a reproduction of pleasing volume, and tone quality.

While I have described my improved sound box with considerable particularity, in order that the invention may be readily understood in what I believe to be its best form, the invention is not limited to the specific construction, proportions, or materials thus described, since these may be

changed within the limits of the claims here-to appended, without departing from the invention. 35

Having thus described my invention, what is claimed is:—

1. In a sound box, a diaphragm casing, a diaphragm mounted therein, a back for said casing having a central opening, a support extending inwardly from the walls of said opening, a ring of resilient material resting on said support and extending beyond the outer surface of said back, a hollow hub projecting into said ring, and means securing said hub to said back on a line passing diametrically through the hub. 40 45

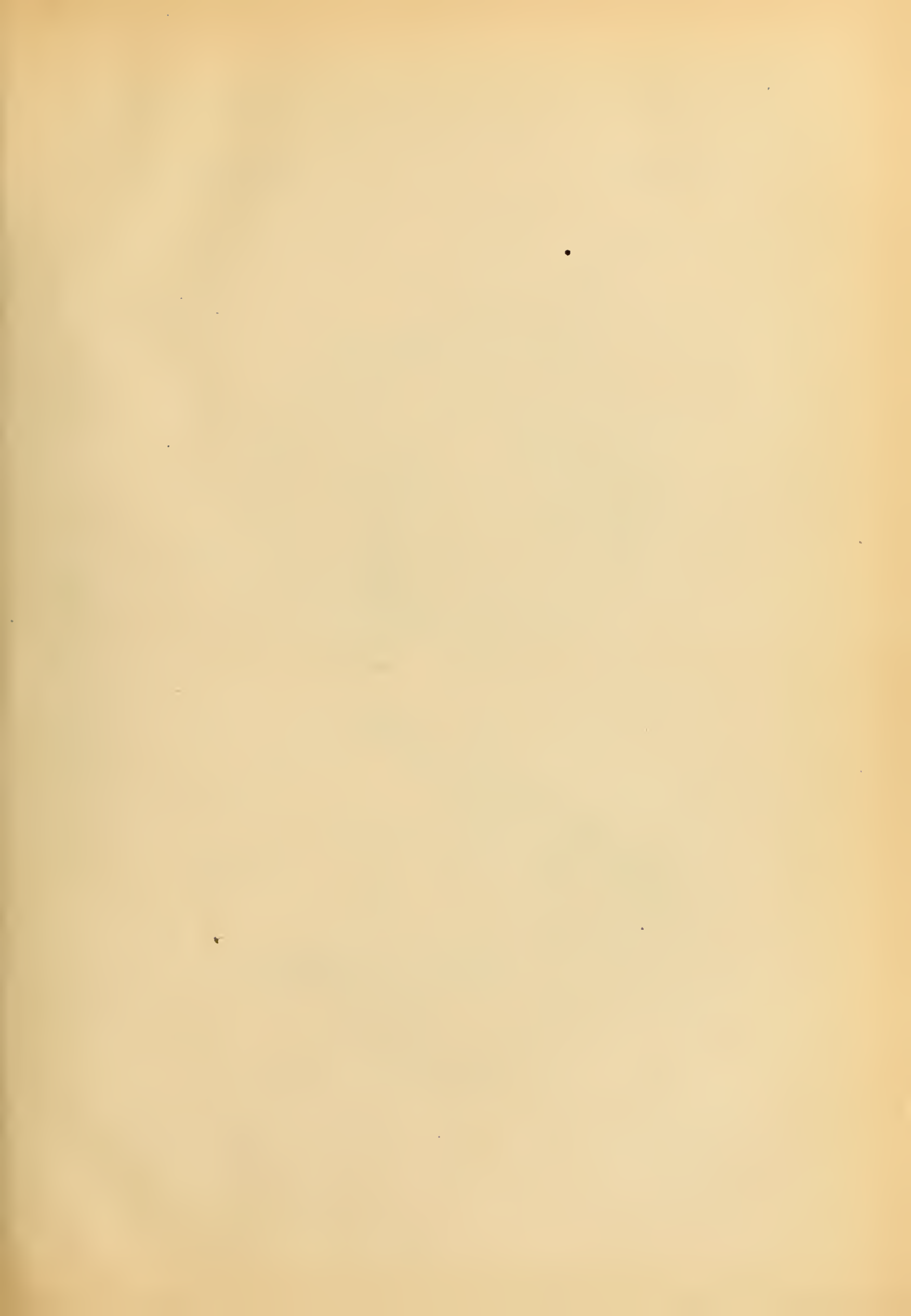
2. In a sound box, a diaphragm and diaphragm casing, a back to said casing having a central opening, a narrow resilient ring projecting into said opening and forming a lining for the wall thereof, a hollow hub having a portion thereof extending into and snugly fitting said ring, a flange on said hub bearing on said ring, and screws extending through said flange for securing said hub to the back of said casing. 50 55

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 60

GEORGE LANSING FUNNELL.

Witnesses:

H. D. JAMESON,  
O. J. WORTH.

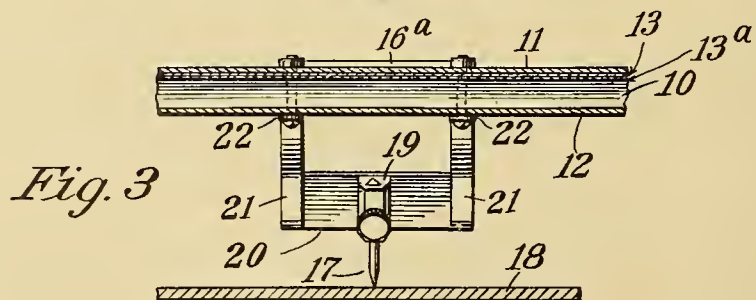
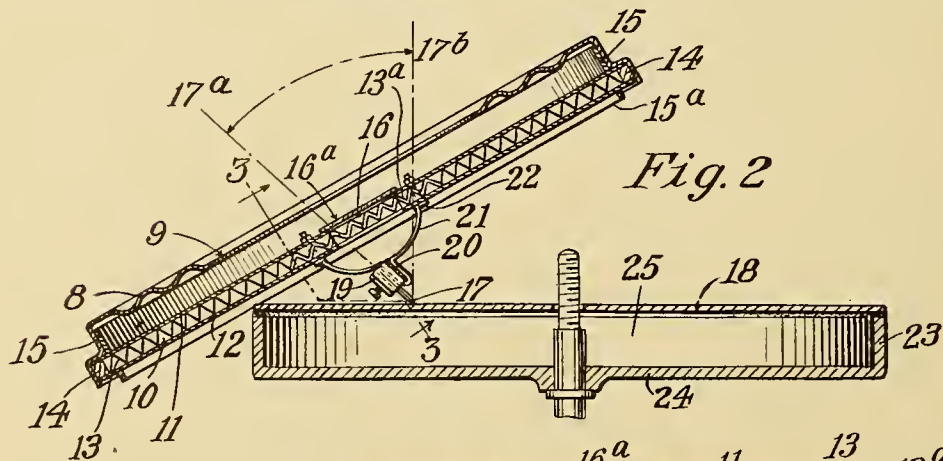
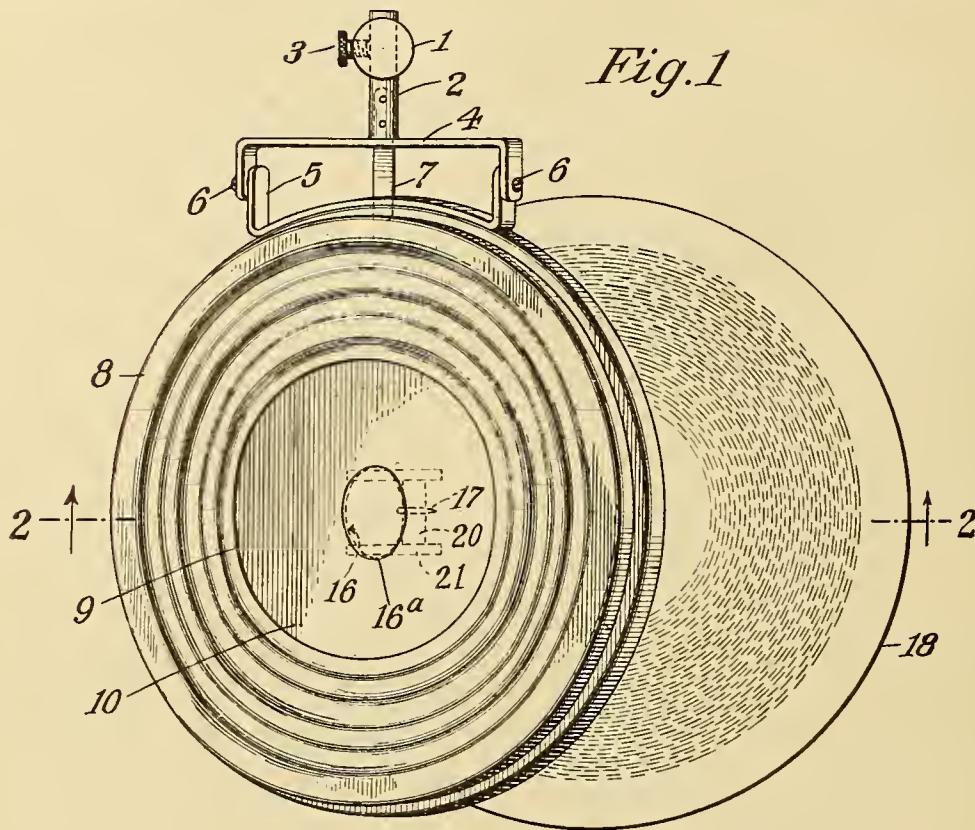




D. M. BLISS.  
 PHONOGRAPH SOUNDING BOARD.  
 APPLICATION FILED MAR. 31, 1914.

1,104,340.

Patented July 21, 1914.



Witnesses:  
 C. D. Morrill  
 Mary Herman

Donald M. Bliss, Inventor  
 By his Attorney Charles Messick

# UNITED STATES PATENT OFFICE.

DONALD M. BLISS, OF ORANGE, NEW JERSEY, ASSIGNOR TO BLISS TALKING MACHINE CO., A CORPORATION OF DELAWARE.

## PHONOGRAPH SOUNDING-BOARD.

1,104,340.

Specification of Letters Patent.

Patented July 21, 1914.

Application filed March 31, 1914. Serial No. 828,489.

*To all whom it may concern:*

Be it known that I, DONALD M. BLISS, a citizen of the Dominion of Canada, residing in Orange, county of Essex, State of New Jersey, have invented an Improvement in Phonograph Sounding-Boards, of which the following is a specification.

The objects of this invention are:—1. To provide vibratory members and sounding board members for all acoustical devices, having the maximum of resilience, lightness and stiffness, and also to incorporate these members in phonographs. 2. To combine a vibratory resonator attached to a stylus mounting with a turntable provided with a resonating chamber of resonant material. 3. To provide improved construction for other associated acoustical and mechanical devices, as will appear more fully from the following detailed description and claims, and to provide a window in a sounding board or resonator.

The advantages of the invention are that these acoustical devices will give improved results, and when incorporated in phonographs together with the associated devices, the phonographs will play either lateral or vertical cut records; have a low cost of manufacture; require no moving parts intermediate the stylus and sounding board; be compact, and also be convenient to operate.

One embodiment of my invention is described in the following detailed description and illustrated in the drawings.

Referring to the accompanying drawings:—Figure 1 is a plan view of my phonograph, containing my sounding board or sounding board diaphragm. Fig. 2 is a partial sectional side elevation of the device of Fig. 1, taken on the line 2—2, looking in the direction of the arrows. Fig. 3 is a partial cross section of the device of Fig. 2, taken on the line 3—3, looking in the direction of the arrows.

The numeral 1 indicates a swivel which may be mounted in any suitable standard, attached to a stationary member of a phonograph. The swivel 1, supports a horizontal rod 2, which is passed through it, and may be locked adjustably in any position by the thumb screw 3, and this rod 2, terminates

in the fork 4, which in turn supports the spring 5, through the medium of the centering screws 6, allowing the spring 5, pivotal motion with relation to the fork 4. Another spring member 7 is fastened at the bottom of the rod 2, and engages the lower portion of the spring 5, partly supporting it and its attached members. Preferably the spring 5, is attached to the edge of an ornamental spun aluminum shell 8, which is provided with an upper central hole 9. This shell 8 supports a sounding board 10, which is fastened in it, as best shown in Fig. 2. Preferably, the sounding board 10 consists of an upper surface member 11 and a lower surface member 12, which are both adapted to act like the chords of a truss. The members 11 and 12 are spaced apart by means of a trussing member 13, consisting of a single sheet of corrugated material, having straight parallel corrugations, reinforced at the central portion by a corrugated sheet of material 13<sup>a</sup>. The surface members 11 and 12 are stretched upon a ring or frame member 14. The surface members 11 and 12, and the trussing members 13 and 13<sup>a</sup>, are preferably made of light fabric or fibrous paper, impregnated with shellac or other stiffening material to increase their sound conductivity and which also binds and attaches these several members permanently together at their adjacent portions. The trussing members 13 and 13<sup>a</sup>, have corrugations providing ridges and furrows which join the face members 11 and 12 at angles of approximately 60 degrees, and collectively these several parts of the sounding board 10 form a truss-like structure. The sounding board 10 is attached to the lower edge of a bridge ring 15, and both are secured within the shell 8, the latter thus forming a vibrating resonating chamber or box. A second bridge ring 15<sup>a</sup> is attached at the bottom of the sounding board 10.

In the preferred construction the trussing member stiffens the sounding board in the longitudinal direction of the ridges and furrows in a manner somewhat similar to the trussing of the flanges of an I-beam by its web, while the trussing effect at right angles to the ridges and furrows is like that



provided by a building truss, so that the complete sounding board is really trussed in all directions. Stretching the face members facilitates assembling the sounding board and physically improves it.

A window 16, is cut through the sounding board, near the center, in order that an operator may see the stylus mounting and the stylus 17, to place them on the record 18. A transparent member 16<sup>a</sup> is put in the window to repair the impaired acoustical qualities which may result from cutting the window.

The device is shown ready to play lateral cut records, the stylus 17 being at an angle of approximately 45 degrees to the radius of the record, which passes through the point of the stylus. The stylus 17 is mounted in a stylus holder 19, which is attached to a spring 20, which is so formed as to be stiff to a thrust of the stylus and flexible to lateral movement thereof. The spring 20, is mounted on the arched frames 21, which terminate in the feet 22, which are mounted upon the sounding board 10, and suitably attached thereto. This stylus mounting is especially adapted for use in combination with my sounding board, and the arrangement of the spring 20, causes it to absorb the lateral movement of the stylus, so that most of the energy that reaches the sounding board 10, consists of the thrusts imparted to the stylus by the right hand wall of a lateral cut record line, as best indicated in Fig. 2.

An imaginary line 17<sup>a</sup> indicates the axis of the stylus in the position for playing lateral cut records. To play vertical cut records, the fork 4 is adjusted at the bar 2, by the thumb screw 3, so that the axis of the stylus assumes the position of the vertical imaginary line 17<sup>b</sup>, with the sounding board 10 and the other members in corresponding positions.

Referring particularly to Fig. 2, a turntable having a rim 23, and a base 24, both preferably made of resonant material, form a turntable resonating chamber 25, adapted to co-act with the record tablet 18 and the resonator attached to the stylus mounting for the improved reproduction of the sound writing on the record tablet.

Variations in any or all of the elements may be made without departing from this invention, in accordance with the progress of the art.

The face members of my improved sounding board exhibit peculiar physical properties which I characterize by the term "stretched", and by the use of this term in the specification and claims I mean it to explain the appearance and condition of the face members which results either from the presence of a stretching frame or ring at the edge of the sounding board or from one

or both of the face members having been subjected to stretching during the assembling of the face member with the trussing means.

I claim:

1. In a sound device, the combination of a face member, and a ridged and furrowed trussing member in intimate contact at the ridges with the face member.

2. In a sound device, the combination of a face member and a ridged and furrowed trussing member secured at the ridges to the face member.

3. In a sound device, the combination of a face member and a ridged and furrowed trussing member, having parallel ridges and furrows, secured at the ridges to the face member.

4. In a sound device, the combination of a face member and a ridged and furrowed trussing member having angular ridges and furrows, secured at the ridges to the face member.

5. In a sound device, the combination of a stretched face member and a ridged and furrowed trussing member in intimate contact at the ridges with the face member.

6. In a sound device, the combination of a stretched face member and a ridged and furrowed trussing member secured at the ridges to the face member.

7. In a sound device, the combination of a face member and a ridged and furrowed trussing member in intimate contact at the ridges with the face member, said device being provided with a window, and a stylus mounting adjacent the window.

8. A sound device consisting of two face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members.

9. A sound device consisting of two face members spaced apart and adapted to act like the chords of a truss, and trussing means connecting the face members, said trussing means consisting of sheet material having alternate attachment to the face members.

10. A sound device consisting of two face members spaced apart and adapted to act like the chords of a truss, and trussing means connecting the face members, said trussing means consisting of sheet material having alternate angular attachment to the face members.

11. A sound device consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members.

12. A sound device consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and trussing means connecting the face members, said trussing means consisting of sheet ma-

70

75

80

85

90

95

100

105

110

115

120

125

130



terial having alternate attachment to the face members.

13. A sound device consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said trussing means consisting of sheet material having alternate angular attachment to the face members.

14. A sound device consisting of two face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said device being provided with a window and a stylus mounting adjacent the window.

15. A sound device consisting of two face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said face members consisting of fibrous sheet material impregnated with a substance to increase the sound conductivity of the face members.

16. A sound device consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said face members consisting of fibrous sheet material impregnated with a substance to increase the sound conductivity of the face members.

17. A sound device consisting of two face members spaced apart and adapted to act like the chords of a truss, distributed trussing means connecting the face members, and a stretching means at the periphery of said sound device to stretch at least one of the face members.

18. In a sound device, a vibratory member consisting of a stretched face member and trussing means in intimate contact with said face member at many places distributed throughout the area of the face member to stiffen the same throughout all the area embraced by the trussing means.

19. In a sound device, a vibratory member consisting of a stretched face member and trussing means in intimate contact with said face member at many places distributed throughout the area of the face member to stiffen the same throughout all the area embraced by the trussing means, said sound device being also provided with a window and a stylus mounting disposed adjacent the window.

20. In a resonator phonograph, the combination of a turntable made of resonant material and provided with a resonating chamber; and a vibratory resonator attached to a stylus mounting, to co-act with the resonating chamber of the turntable, for the reproduction of the sound writing on a record tablet.

21. In a resonator phonograph, the combination of a turntable made of resonant

material and provided with a resonating chamber; and a vibratory resonator attached to a stylus mounting, provided with a sounding board having a trussed structure, to co-act with the resonating chamber of the turntable, for the reproduction of the sound writing on a record tablet.

22. In a resonator phonograph, the combination of a turntable made of resonant material and provided with a resonating chamber; and a vibratory resonator attached to a stylus mounting, to co-act with the resonating chamber of the turntable, for the reproduction of the sound writing on a record tablet, said vibratory resonator being provided with a window through which a record tablet may be observed.

23. In a resonator phonograph, the combination of a turntable made of resonant material and provided with resonating chamber; and a vibratory resonator attached to a stylus mounting, provided with a sounding board having a trussed structure, to co-act with the resonating chamber of the turntable, for the reproduction of the sound writing on a record tablet, said sounding board being provided with a window through which a record tablet may be observed.

24. A sound device provided with a face member, a distributed trussing member, and a rim or frame member to stretch the face member.

25. A sound device provided with a face member, a distributed trussing member, and a rim or frame member to stretch the face member, said sound device being also provided with a window and a stylus mounting disposed adjacent the window.

26. A phonograph sounding board diaphragm consisting of two face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, and a stylus device connected to said diaphragm.

27. A phonograph sounding board diaphragm consisting of two face members spaced apart and adapted to act like the chords of a truss, and trussing means connecting the face members, said trussing means consisting of sheet material having alternate attachment to the face members, and a stylus device connected to said diaphragm.

28. A phonograph sounding board diaphragm consisting of two face members spaced apart and adapted to act like the chords of a truss, and trussing means connecting the face members, said trussing means consisting of sheet material having alternate angular attachment to the face members, and a stylus device connected to said diaphragm.

29. A phonograph sounding board diaphragm consisting of two stretched face

70

75

80

85

90

95

100

105

110

115

120

125

130

members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, and a stylus device connected to said diaphragm.

5 30. A phonograph sounding board diaphragm consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and trussing means  
10 connecting the face members, said trussing means consisting of sheet material having alternate attachment to the face members, and a stylus device connected to said diaphragm.

15 31. A phonograph sounding board diaphragm consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and trussing means  
20 connecting the face members, said trussing means consisting of sheet material having alternate angular attachment to the face members, and a stylus device connected to said diaphragm.

25 32. A phonograph sounding board diaphragm consisting of two face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said diaphragm being provided with a window  
33. A phonograph sounding board diaphragm consisting of two face members

spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said face members consisting of fibrous sheet material impregnated with a substance to increase the sound conductivity of the face members, and a stylus device connected to said diaphragm.

34. A phonograph sounding board diaphragm consisting of two stretched face members spaced apart and adapted to act like the chords of a truss, and distributed trussing means connecting the face members, said face members consisting of fibrous sheet material impregnated with a substance to increase the sound conductivity of the face members, and a stylus device connected to said diaphragm.

35. A phonograph sounding board diaphragm consisting of two face members spaced apart and adapted to act like the chords of a truss, distributed trussing means connecting the face members, and a stretching means at the periphery of said diaphragm to stretch at least one of the face members, and a stylus device connected to said diaphragm.

DONALD M. BLISS.

Witnesses:

WALTON HARRISON,  
JOHN COMERY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."





W. V. GERSTER.  
 AUTOMATIC STOP FOR SOUND REPRODUCING MACHINES.  
 APPLICATION FILED OCT. 11, 1912.

1,104,489.

Patented July 21, 1914.

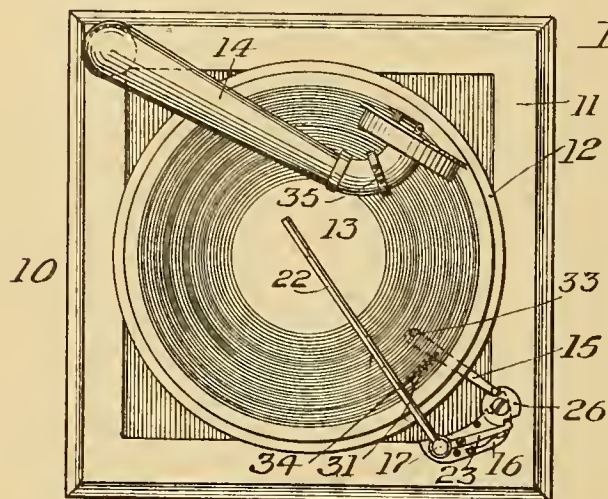


Fig. 1.

Fig. 7.

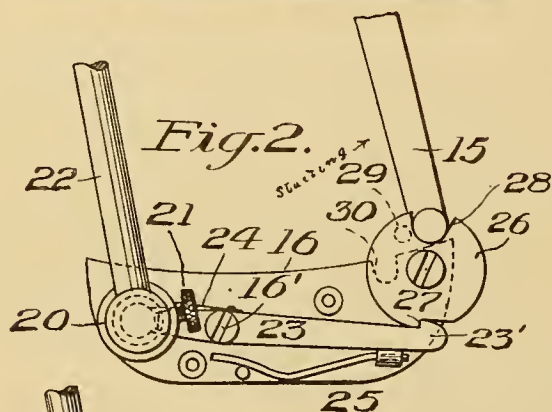


Fig. 2.

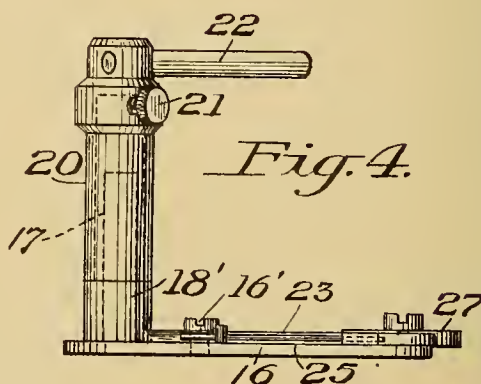


Fig. 4.

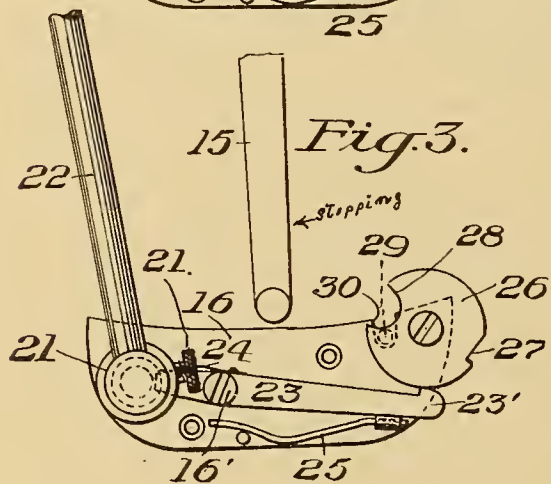


Fig. 3.

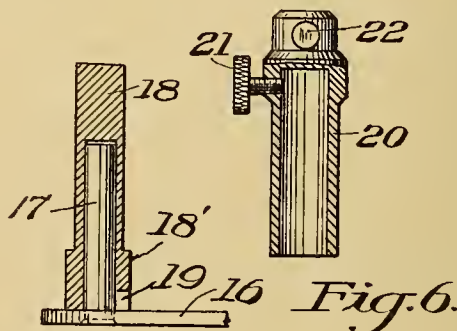


Fig. 5.

Witnesses  
 John M. Prescott Jr.  
 Edward J. Parker

Inventor  
 William V. Gerster  
 By John J. Power  
 Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM V. GERSTER, OF PITTSBURGH, PENNSYLVANIA.

## AUTOMATIC STOP FOR SOUND-REPRODUCING MACHINES.

1,104,489.

Specification of Letters Patent.

Patented July 21, 1914.

Application filed October 11, 1912. Serial No. 725,204.

*To all whom it may concern:*

Be it known that I, WILLIAM V. GERSTER, a citizen of the United States, resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automatic Stops for Sound - Reproducing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to automatic stops for sound producing machines.

The object of my invention is to provide a simple and effective device for causing the operating of the mechanism of such a machine to be discontinued upon the rendering of a record.

A further object of my invention is to effect a construction of stop that will permit the same to be attached and maintained operatively on the machine without inconvenience to the positioning or removing of records.

In the accompanying drawings, Figure 1 is a plan view representing a sound reproducing machine having my invention connected thereto. Figs. 2 and 3 are enlarged plan views showing my invention and the common operating lever of the machine in different operative positions. Fig. 4 is a view, in elevation of the parts shown in Figs. 2 and 3, without the common operating lever and its actuating mechanism. Figs. 5 and 6 are similar views of parts shown in Fig. 4. Fig. 7 is a view, in elevation, of a band or clamp pin.

Reference numerals in the following specifications refer to like parts in the drawings in which a well known construction of sound reproducing machine is represented comprising the usual stand 11, rotary table 12 on which is carried the disk record 13, a sound arm 14, and a common operating lever 15 for controlling the operation of the mechanism of the machine. (Fig. 1.) A small base plate 16 having a spindle 17 at one end thereof is suitably secured upon the stand 11. On the spindle 17 (Figs. 4 and 5) a swivel pin 18, having an enlarged base 18' is mounted, said enlarged base having a slot 19 at its lower extremity. Over the swivel pin 18 a swivel cap 20 is carried on the base 18', the said cap being provided with a set screw 21 for engaging the swivel pin 18, and having a rod 22 projecting therefrom. Operatively secured at 16' (Figs. 2 and 3) is a pawl 23 one end of which extends into the slot 19 as does also one end of a spring 24 which is

attached to said pawl for the purpose of taking up any slack between the pawl and the sides of the slot. The other end 23' of the pawl is subject to pressure from a spring 25 which forces the pawl against the periphery of the ratchet 26 so as to engage the notch 27 of the latter which ratchet is operatively secured upon the base plate 16. The ratchet is also provided with a notch 28 and a stud 29 which is adapted to limit the movement of the ratchet in one direction by contact with the base plate 16 in the recess 30. The common starting lever 15 is subjected to pressure when at the point designated as the starting point, (Fig. 2) preferably by a spring 31, (Fig. 1) having one end suitably secured, preferably to a small shaft (not shown) which may be keyed to the lower end of the pin 33 upon which the starting lever is carried, for the purpose of operating the latter, the other end of the spring 31 being secured at any suitable point, as at 34, so that it will exercise a strain upon the starting lever when the latter is at the starting position.

With the device constructed as shown and described it may be secured to the stand 11 by common screws inserted through suitable openings in the base plate 16, which is positioned relative to the outer end of the starting lever 15, so that the notch 28 in the ratchet 26 will be engaged when the lever is moved toward the starting point and will thereby be turned until the notch 27 meets and is engaged by the end 23' of the pawl by reason of the pressure of the spring 25 as the lever attains the starting position.

Assuming the set screw 21 to be loose, the projecting rod 22 may be projected outside the plane of the rotary table 12, so that the usual record may be positioned on the table, without any trouble or inconvenience peculiar to my invention being attached. After the record has been positioned the sound arm may be moved over the record so that the needle (not shown) is at a point where the inscribed music on the record is terminated. While the needle is at this point the projecting rod 22 is swung over the disk and against the band-pin 35 and while the rod is in contact with the latter the set screw 21 is tightened against the swivel pin 18 for the purpose of causing said set screw to operate the swivel pin when the rod is operated by the sound arm. The sound arm may then be moved to carry the needle to the point of the beginning of the inscribed music



on the record, (Fig. 1). The common starting lever 15 may then be moved in the direction of the starting point (Figs. 1 and 2) which movement distends the spring 31, (Fig. 1) and the outer end of the lever engages the notch 28 of the ratchet 26 which is thereby turned until the notch 27 is engaged by the pawl for the purpose of enabling the latter to hold the lever at the starting position by resisting the strain of the spring 31 upon said lever. The machine being thus set in motion the sound arm 13 moves in the regular way, carrying the band pin 35 toward and against the projecting rod 22 moving the same and consequently the swivel-cap 20, which by means of the set screw 21 jointly actuates the swivel-pin 18 against the end of the pawl 23 in the slot 19, thereby withdrawing the end 23' from the notch 27 of the ratchet. Thereupon the contraction of the spring 31 quickly actuates the pin 33 by means of the key shaft (not shown), previously referred to, to draw the starting lever to the stop position and in so doing reverses the ratchet, the stud 29 limiting the latter movement of the ratchet for the purpose of positioning the notch 28 (Fig. 3) so that it will be engaged by the lever, upon a subsequent return of the latter to a starting position. It will be obvious that various changes and modifications may be made in the construction of the device herein shown and described. For example other means may be employed for returning the starting lever to the stopping position, and various other means may be adopted for engaging the lever at the starting position, all of which may be done without departing from the spirit of my invention or sacrificing any of its advantages.

What I claim as my invention and desire to secure by Letters Patent, is—

1. The combination with a rotating element, a traveling member, and a controlling lever, of a holding member positioned in the path of the controlling lever and operated to and from a holding position by said lever when the latter is moved to and from the starting position, a spring tensionally disposed to retract the controlling lever from the starting position, a pawl for engaging said holding member and holding the same inoperative against the tension of said spring to thereby maintain the controlling lever at the starting position, a swivelly mounted projecting rod, and a swivelly mounted member operated by a movement of said rod to actuate the pawl to disengage said holding member.

2. The combination with a rotating element, a traveling member, and a controlling lever, of a horizontally projecting rod swivelly mounted, a swivelly mounted bearing

carrying said rod, a holding member operated by said controlling lever to and from a holding position by the movement of the latter to and from the starting position, a spring tensionally disposed to retract said controlling lever from the starting position, a pawl arranged to engage the holding member when said controlling lever is at the starting position to hold said holding member inoperative against the tension of said spring, and means for effecting a movement of said swivel bearing simultaneously with a movement of said swivel rod.

3. The combination with a rotating element, a traveling member and a controlling lever, of a swivelly mounted horizontally projecting rod, a swivelly mounted bearing carrying said rod, means for effecting a movement of said bearing simultaneously with a movement of said rod, a holding member operating to and from a holding position by the movement of said lever, a pawl having one end positioned to engage said holding member, the other end of said pawl being engaged by said swivel bearing, and means carried by said traveling member for actuating said rod during the operation of the traveling member and thereby to effect a combined movement of the rod and said bearing to disengage the pawl from said holding member.

4. The combination with a rotating element, a traveling member, and a controlling lever, of a swivelly mounted horizontally projecting rod, a swivelly mounted bearing carrying said rod, means for effecting a movement of said bearing simultaneously with a movement of the rod, a holding member operatively positioned in the path of the controlling lever to be operated to and from a holding position by said lever during a movement of the latter to and from the starting position, a spring tensionally disposed to effect a return movement of the said holding member from the starting position, a spring actuated pawl having one end engaging said holding member after the latter has been operated by the controlling lever, the other end of said pawl being engaged by said swivel bearing, and means carried by said traveling member for engaging said rod during the operating of the machine to effect a combined movement of said rod and swivel bearing and thereby operate said pawl to release the holding member and permit said tensionally disposed spring to return said controlling lever to the stopping point.

In testimony whereof, I the said WILLIAM V. GERSTER have hereunto set my hand.

WILLIAM V. GERSTER.

Witnesses:

JOHN M. PRESCOTT, Jr.,  
J. OSCAR EMRICH.

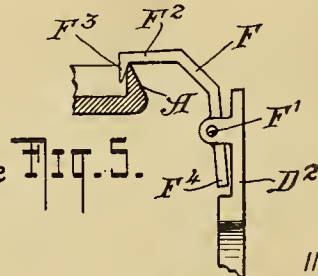
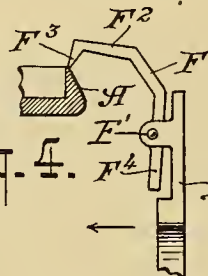
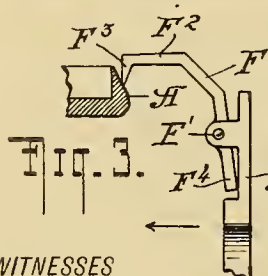
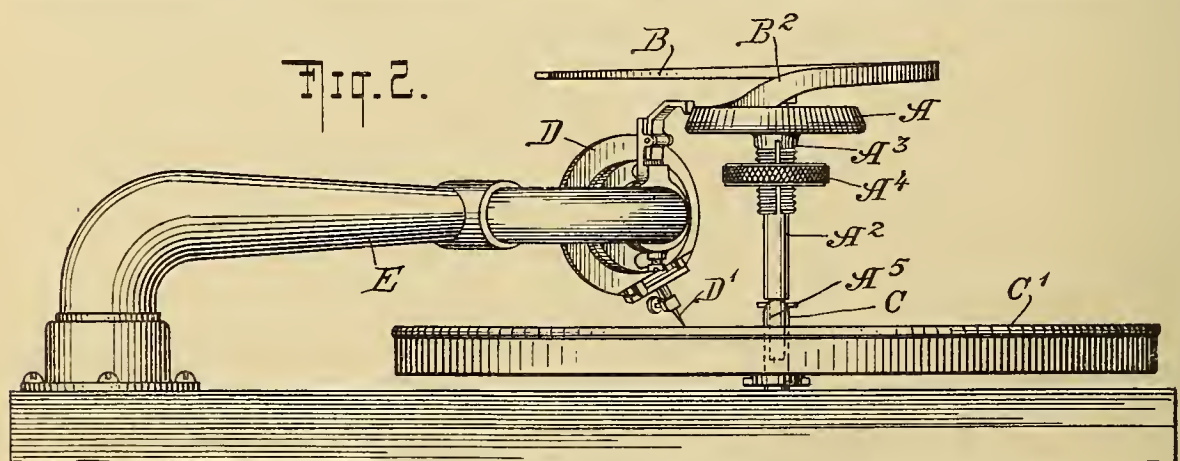
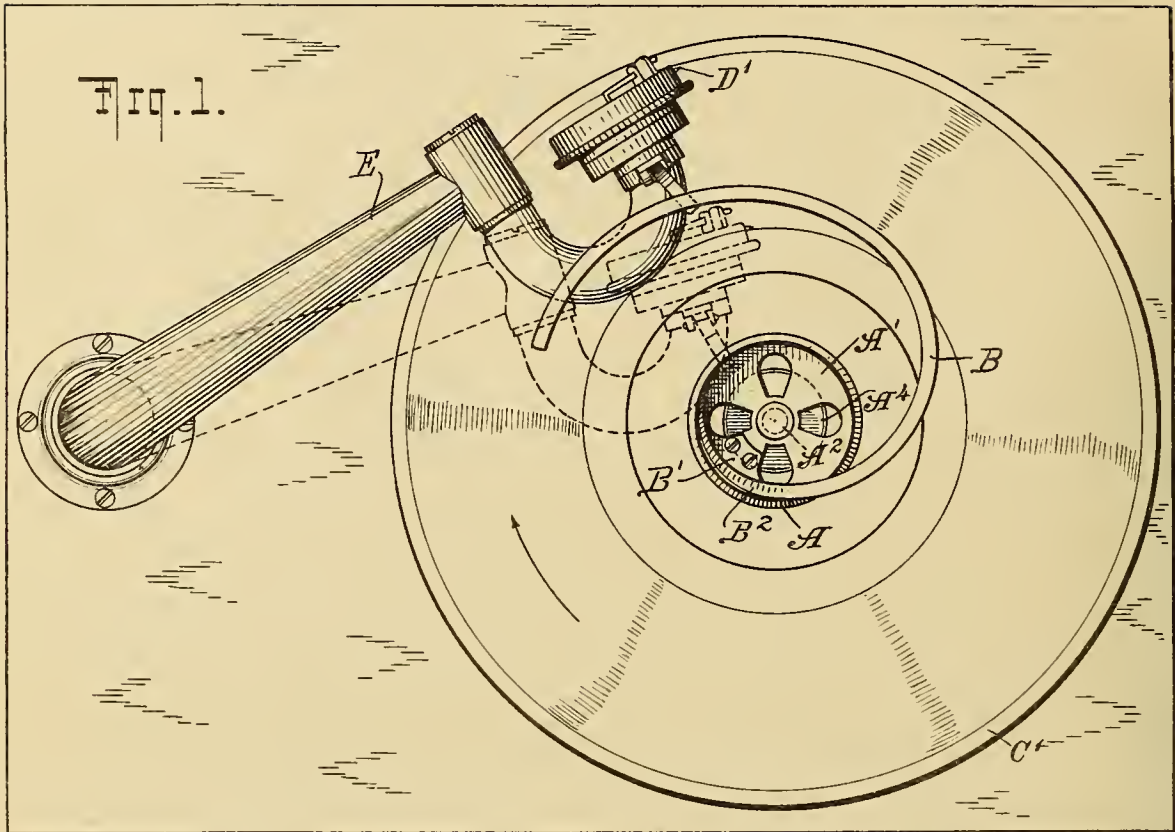




L. ABRAHAM.  
 REPEATING DEVICE FOR DISK TALKING MACHINES.  
 APPLICATION FILED DEC. 26, 1913.

1,104,760.

Patented July 28, 1914.



WITNESSES

G. V. Rasmussen  
 M. H. Lockwood

INVENTOR

LAWRENCE ABRAHAM

BY  
 Briesen & Knauth  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

LAWRENCE ABRAHAM, OF NEW YORK, N. Y.

REPEATING DEVICE FOR DISK TALKING-MACHINES.

1,104,760.

Specification of Letters Patent.

Patented July 28, 1914.

Application filed December 26, 1913. Serial No. 808,711.

*To all whom it may concern:*

Be it known that I, LAWRENCE ABRAHAM, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Repeating Devices for Disk Talking-Machines, of which the following is a specification.

My invention relates more particularly to a device for use in connection with disk record machines and is particularly adapted for the well known Victor talking machine. The herein described device is an improved form of a similar device shown and described in my application Serial No. 804,622 filed December 4, 1913.

With certain records, and under certain circumstances it is frequently desirable to repeat or have the record played over and over. Ordinarily, this can be done only by attention on the part of the operator, who must lift the needle at the end of the record, swing it out and set it on the disk again at the beginning of the record. It will be understood that if the operator neglects to lift the needle at the proper time the harmonious playing will be followed by rasping noises produced by a scraping of the needle.

My invention has for its object, by the attachment of a simple device, to overcome the last named difficulty and to automatically lift the needle at the end of the record and swing it outward to the starting point and lower it into contact with the disk so that the record may be played over and over again, as long as required, without any attention on the part of the operator. In my former application this is accomplished by revolving a spiral track in unison with the disk, the inner end of the track being adapted to dip down so as to intercept an arm secured to the sound box casing as the end of the record is reached whereby the needle is caused to be lifted by the arm riding up on to the spiral, and following the track, is carried outward toward the periphery of the disk where the arm passes off the track and the needle is lowered into contact with the disk at or near the starting point of the record. In practice it has been found that with some records the rigid arm and the dipping inner end of the spiral track do not come together properly with the result that the continuity of the playing is some-

times interfered with. In my present invention this is avoided by providing a beveled circular track substantially coincident with the inner dipping end of the spiral track and pivotally mounting the arm or pawl carried by the sound box so that under light pressure as the needle nears the end of the record, the end of the pawl will slide up the inclined or beveled outer circumference of the circular track. The parts are usually proportioned so that the pawl will snap over the upper edge of the circular track while the needle is on the last spiral thread at the end of the record and in this position will be readily engaged by the dipping inner end of the spiral track, after which the needle will be lifted and carried outward to the starting point of the record as with the device previously described. This improved form of my device is shown in the accompanying drawings of which—

Figure 1 represents a plan view of a talking machine with my improvement applied thereto; Fig. 2 is a side elevation thereof, and Figs. 3, 4 and 5 show detail views of the pawl in operation.

Referring to the drawings, A represents a circular track and B a spiral track located one above the other in planes parallel to the record disk. The track A is concentrically arranged about a rod or axle  $A^2$  and is preferably secured by arms or spokes  $A'$  to a split collar  $A^3$  adjustably secured by a set nut  $A^4$  to the upright rod or axle  $A^2$ , which is preferably squared at its lower end  $A^5$  and inserted in a square hole in the end of the arbor, or axle C of the revoluble table or support for the record disk C'. The spiral track B is preferably secured at its inner end to the circular track A at B', the inner end B<sup>2</sup> of the spiral B dipping down to the level of the track A and the outer free end portion of said spiral B being preferably made somewhat yielding or flexible. The dipping end B<sup>2</sup> of the spiral track is preferably circular and concentric with the inner face of the circular track A. Thus the tracks A and B are mounted to revolve in unison with the disk C', and the length of the post  $A^2$  is such that the plane of the spiral track B may be adjusted to stand above the sound box D carrying the needle D', so as to clear the same as they whirl around with the disk. The tone arm E, as usual in this type of machine, constitutes



the horn which is adapted to swing in a horizontal plane, the end of the tone arm being provided with a transverse joint so that the diaphragm and needle may have a vertical movement, as well as the horizontal, for lifting the needle from the record.

The outer face of the circular track is preferably beveled, as indicated in the drawings, and a movable resilient pawl F is pivotally mounted at F' upon a bracket D<sup>2</sup> secured to the back of the sound box D, and is provided with a laterally projecting arm F<sup>2</sup> adapted to cooperate with the circular and spiral tracks A and B. The outer end of the pawl is preferably provided with a depending lug F<sup>3</sup> adapted to snap or drop over the upper edge of the circular track A as indicated in Fig. 5 and afterward engage and ride upon the upper and inner face of the spiral track B.

Gravity or a suitable spring is adapted to hold the pawl F in the position indicated in Fig. 3, the lower end F<sup>4</sup> of the pawl being extended beyond the pivot F' to engage the bracket or pawl support D<sup>2</sup> and limit the movement of the pawl in one direction as indicated in the drawings. From this arrangement it will be seen that as the needle follows the spiral thread of the record and is gradually fed inward toward the axis of the record disk the pawl F will be carried toward the circular track A. As the end of the record is approached the lug F<sup>3</sup> will strike the bevel of the track A and as the needle follows the spiral thread of the record the pawl will gradually be lifted as indicated in Figs. 3 to 5 until the lug F<sup>3</sup> snaps over the upper edge, after which the pawl is in position to engage the dipping end B' of the spiral track B. When this latter engagement takes place the pawl will ride up on to the track B and the needle will be lifted from the disk and by means of the track carried outward to the starting point of the record. When the outer end of the track B is reached the weight of the sound box and connected parts will cause the said outer end to yield so that the needle will be gradually lowered and will finally be brought into contact with the disk as the pawl F, F<sup>3</sup> leaves the end of the track and the pawl will drop to the position indicated in Fig. 3. In this position the pawl will clear the under side of the spiral track B as it revolves and at the same time be in position to again engage the beveled face of the circular track A. Thus my device is adapted to automatically repeat the playing of a record as long as the motor of the machine is in operation.

Preferably the circular track A is adjustably mounted upon the rod A<sup>2</sup>, as indicated, for the purpose of raising or lowering the plane thereof with respect to the pawl F.

The object of this adjustment is to vary the

time required for the end F<sup>3</sup> of the pawl to ride up the incline and snap over the upper edge of the track A. By this means I am enabled to vary the lifting of the needle as required by different records, since the radial distance of the end of the records varies slightly for different disks.

My improved device herein described has in practice given satisfactory results and is efficient in operation but I do not wish to be limited to the specific details of construction for it will readily be understood that various modifications may be made without departing from the spirit and scope of the claims.

I claim:

1. In a repeating device for talking machines the combination with a revolving disk support and a movable needle supporting arm adapted for horizontal and vertical movement with respect to the disk, of an annular track member in a plane parallel to said disk and concentric with the axis thereof, a spiral track taking off from the inner face of said annular track rising over the same and extending in a plane above the plane of the annular track to a point a predetermined distance from the said annular track and means for supporting said annular and spiral tracks and revolving them in unison with said disk support.

2. In a repeating device for talking machines the combination with a revolving disk support and a movable needle supporting arm adapted for horizontal and vertical movement with respect to the disk of an annular track member in a plane parallel to said disk and concentric with the axis thereof, a spiral track taking off from the inner face of said annular track, rising over the same and extending in a plane above the plane of the annular track to a point a predetermined distance from the said annular track, means for supporting said annular and spiral tracks and revolving them in unison with said disk support, and means carried by said needle arm adapted to engage said annular track and ride upon said spiral track to lift said needle and carry it outward to the starting point of said record.

3. In a repeating device for talking machines the combination with a revolving disk support and a movable needle supporting arm adapted for horizontal and vertical movement with respect to the disk of a circular track and a spiral track adapted to cooperate, each in a different plane, means for revolubly supporting said tracks a predetermined distance above said disk, a movable pawl pivotally supported on said needle support and adapted to engage and ride upon said tracks and means for limiting the movement of said pawl.

4. In a repeating device for talking machines the combination with a revolving disk support and a movable needle support-



ing arm adapted for horizontal and vertical movement with respect to the disk of a circular track having a beveled outer face and a connected spiral track each in a different plane, the inner end of said spiral track dipping to the plane of said circular track on the inner face thereof, means for adjustably supporting said circular and spiral tracks at a predetermined distance above the disk, and movable means carried by the needle support adapted to cooperate with said tracks to lift the needle at the end of a record and carry it to the starting point, substantially as described.

5. In a repeating device for talking machines the combination with a revolving disk support and a movable needle supporting arm adapted for horizontal and vertical movement with respect to the disk of a circular track beveled on its outer face and lying in a plane parallel to and above said disk, a spiral track in a plane above said circular track, and having its inner end inclined and brought to the level of said circular track and coincident with the inner face thereof, the outer end of said spiral track being located at a predetermined radial distance from said circular track, means for supporting said tracks and revolving the same in unison with the disk and a pivoted pawl supported upon said needle arm in position to engage the beveled face of said circular track and ride up the same and engage and follow said spiral track whereby the needle is lifted at the end of the record of a disk and carried to the starting point automatically.

6. In a repeating device for talking machines the combination of a rotatable record table, a movable needle supporting arm, an annular track, a spiral track, said tracks being adapted to cooperate to move said needle from an operative position and back approximately to its starting point, means for rotatably supporting said tracks above said table and a pawl movably carried by

said supporting arm and adapted to engage and ride up on said tracks.

7. In a repeating device for talking machines the combination of a rotatable record table, a movable reproducing needle, a spiral track adapted to lift said needle from an operative position and move it back approximately to its starting point, an annular track located below said spiral track and connected therewith whereby said needle is guided to said spiral track and means for removably connecting said tracks with said table.

8. In a repeating device for talking machines, the combination of a rotatable record table, a movable reproducing needle, an upright rod detachably connected with the axis of said table, a spiral track arranged to lift said needle from an operative position and return it approximately to its starting point, an annular track connected with said spiral track and adapted to guide said needle thereto, a collar on said annular track adapted for connection with said upright rod and adjustable lengthwise thereof and means for securing said collar in an adjusted position on said rod.

9. In a repeating device for talking machines a rotatable record table, a movable reproducer needle, a projection connected to move therewith, means cooperating with said projection for lifting said needle from an operative position and for returning it approximately to its starting point, and means for adjusting the distance between such first named means and said rotatable table whereby said first named means may be positioned relatively to said projection.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

LAWRENCE ABRAHAM.

Witnesses:

PAUL W. FRESE,  
BENJAMIN J. CONROY.



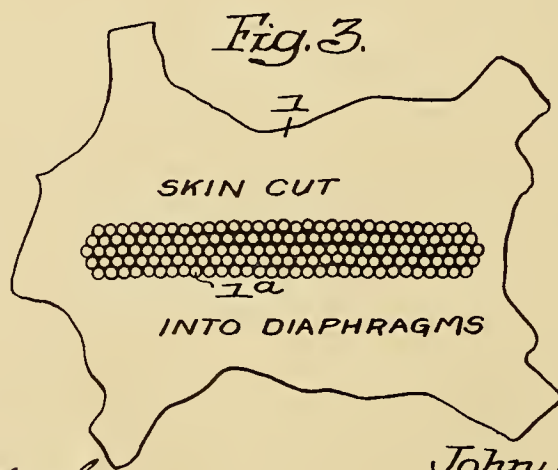
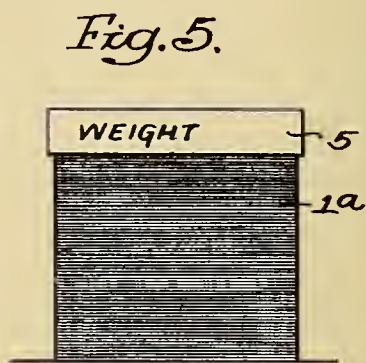
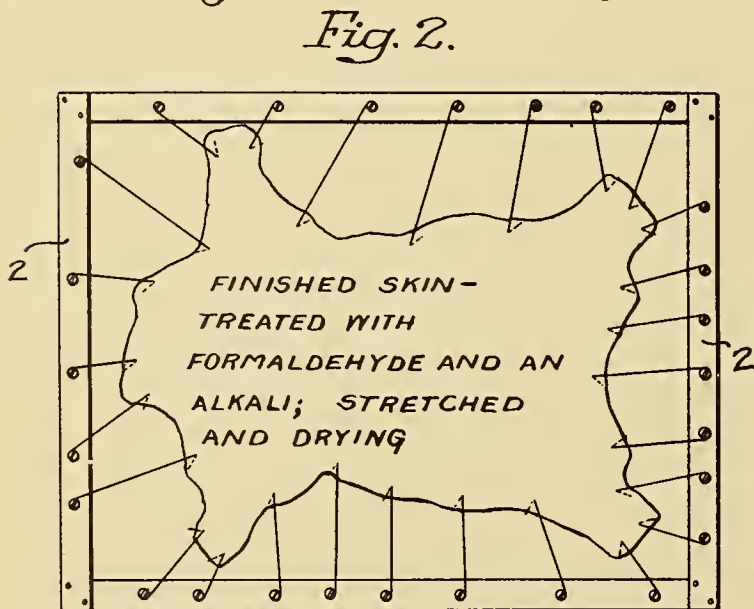
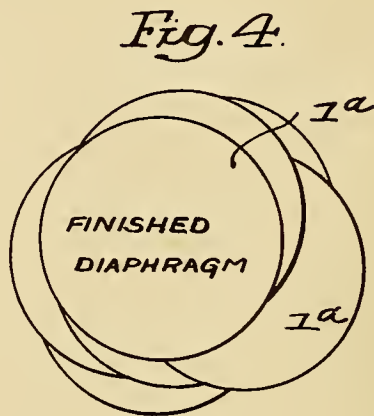
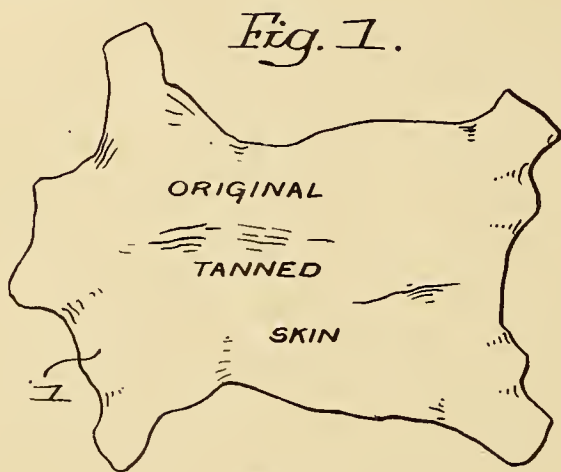




J. SCHMITTINGER.  
 DIAPHRAGM FOR THE SOUND BOXES OF TALKING MACHINES.  
 APPLICATION FILED MAY 15, 1912.

1,104,833.

Patented July 28, 1914.



Witnesses:-

Charles H. York.  
 Willard Burrows.

Inventor:

John Schmittinger  
 by his Attorneys:-  
 Howson & Howson

# UNITED STATES PATENT OFFICE.

JOHN SCHMITTINGER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HOSMER W. HANNA, OF PHILADELPHIA, PENNSYLVANIA.

## DIAPHRAGM FOR THE SOUND-BOXES OF TALKING-MACHINES.

1,104,833.

Specification of Letters Patent.

Patented July 28, 1914.

Application filed May 15, 1912. Serial No. 697,534.

*To all whom it may concern:*

Be it known that I, JOHN SCHMITTINGER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented  
5 Improvements in Diaphragms for the Sound - Boxes of Talking - Machines, of which the following is a specification.

My invention relates to diaphragms for sound reproducing apparatus, more particularly the sound-boxes employed with  
10 talking machines; and the object of my invention is to provide an improved form of diaphragm designed to produce a softer tone than diaphragms heretofore employed  
15 for the same purpose.

It is well known that it is impossible to obtain the best results with sound reproducing diaphragms made of the ordinary materials now in common use, such as metal,  
20 paper, mica, &c., and while mica perhaps has gone into greater use than other materials, such diaphragms are extremely fragile and very expensive owing to the waste incident to the making of disks of  
25 the proper size.

My improved diaphragm is made of an animal skin or integument treated in a peculiar and particular manner, which treatment results in the production of a  
30 diaphragm capable, when employed as a reproducing agent in talking machine of the graphophone or phonograph type, of producing pleasing tones, avoiding the harshness and scratchiness common in the  
35 use of many articles of this kind.

In the accompanying drawings, I have illustrated more or less diagrammatically the steps in the treatment of the material of which the diaphragms forming the sub-  
40 ject of my invention are made, in which:

Figure 1, is a plan view of a skin from which the diaphragms are subsequently cut, showing the same before treatment; Fig. 2, is a view showing the treated skin mounted  
45 in a stretching frame; Fig. 3, is a view of the finally treated skin, illustrating the cutting of the diaphragms therefrom; Fig. 4, shows the finished diaphragms, and Fig. 5, shows a pile of the finished diaphragms  
50 weighted to insure maintenance of the same in a flat condition.

The material from which my improved diaphragms are made is that employed by banjo-makers for the banjo heads, being a  
55 calf skin which has been tanned in a pecu-

liar manner to form what is technically known as "vellum." Of such skins, I prefer to use the portion taken from the back of the calf adjacent the backbone, and it is desirable that these skins be taken from  
60 calves as young as possible, preferably those new-born.

In some instances goat skins prepared for the same or similar purpose may be employed as the "raw" material from which  
65 my improved diaphragms are made.

In the drawings, 1 represents a skin in the condition received from the tanner. The skins thus procured are subjected to a bath consisting of about sixteen ounces of  
70 formaldehyde, (the usual 40% commercial solution of formic aldehyde), in which has been dissolved about one ounce of a suitable alkali, caustic potash (potassium hydrate), being preferred. The skins may be kept in  
75 such bath for a period of about 5 to 10 minutes, as may be necessary to effect substantially a retanning of the same and to soften them sufficiently to insure the desired stretching whereby they are increased in  
80 area and reduced in thickness. After this treatment, the skins are rinsed in cold water to remove all traces of the formaldehyde and caustic potash, and then they are placed in a suitable stretching frame 2, such as shown in Fig. 2 and dried.  
85

When dry, the skins will be found to be much thinner, tougher, and substantially transparent, the original "raw" skin having been opaque; making ideal diaphragms.  
90 They may be cut from the skin as illustrated in Fig. 3 by suitable means into the desired disks, as shown at 1<sup>a</sup> Fig. 4, which may be placed directly in the sound boxes, or packed away for further use. In the  
95 latter case they are preferably kept under more or less pressure as by means of a weight 5 to avoid warping or wrinkling.

In use there is no tendency of the diaphragms to swell or loosen, remaining perfectly taut, and in practice there seems to be some slight tendency to shrink; enhancing their vibratory qualities.

I claim:

1. A diaphragm for sound recording and  
105 reproducing machines, comprising a disk of previously tanned animal fiber hardened and toughened by the action of formaldehyde.

2. A diaphragm for sound recording and  
110



reproducing machines, comprising a disk of previously tanned animal fiber hardened and toughened by the action of formaldehyde and caustic potash.

5 3. A diaphragm for sound recording and reproducing machines, comprising a disk of calf skin previously tanned to the form of vellum, hardened and toughened by the action of formaldehyde.

10 4. A diaphragm for sound recording and reproducing machines, comprising a disk of

calf skin previously tanned to the form of vellum, hardened and toughened by the action of formaldehyde and caustic potash.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN SCHMITTINGER.

Witnesses:

MURRAY C. BOYER,  
Jos. H. KLEIN.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



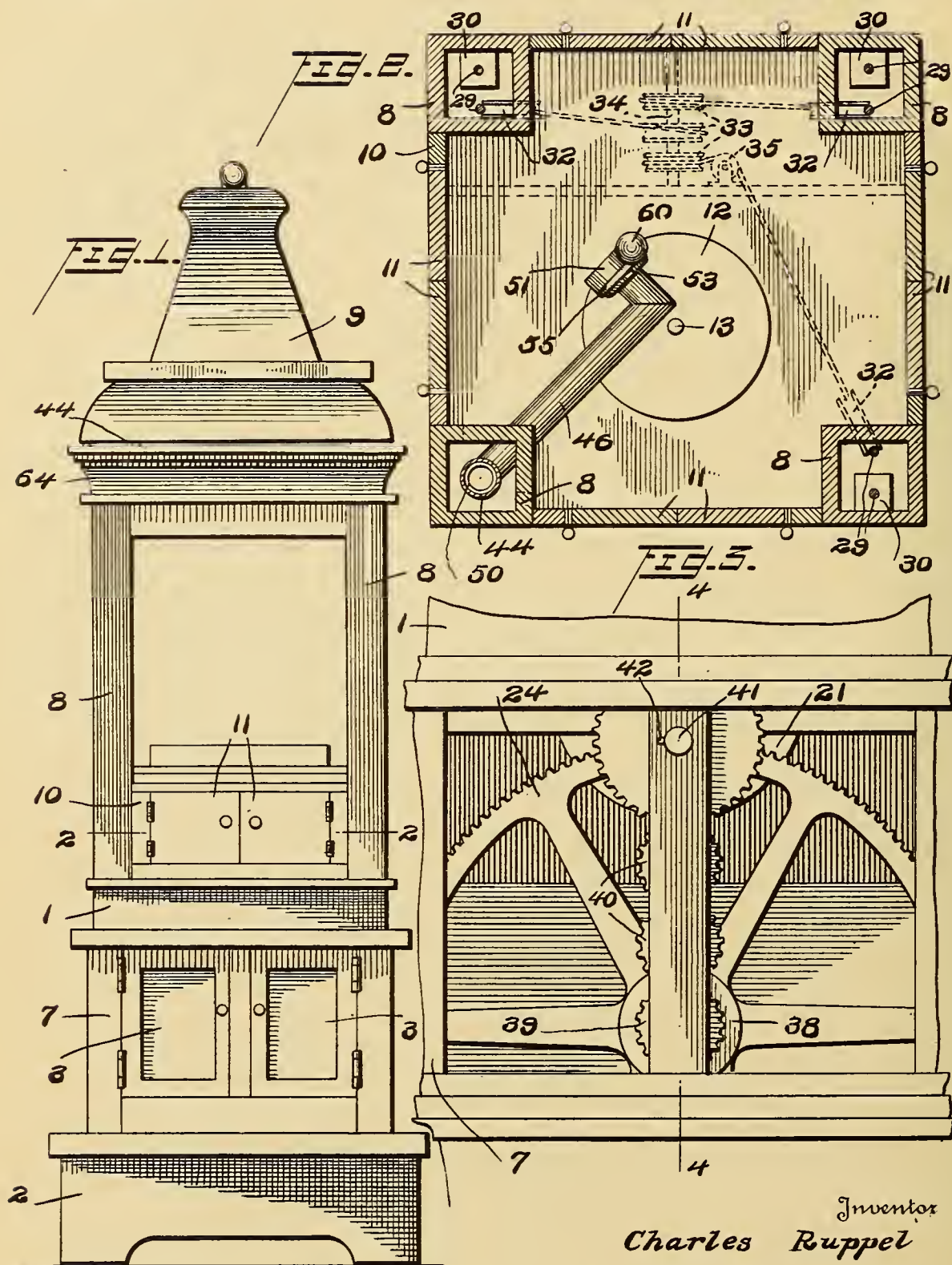
C. RUPPEL.  
TALKING MACHINE.

APPLICATION FILED OCT. 27, 1913.

Patented July 28, 1914.

3 SHEETS-SHEET 1.

1,104,935.



Witnesses

Harold S. Thomas  
C. R. Ziegler.

Inventor  
Charles Ruppel

By Joshua R. H. Potts.  
Attorney

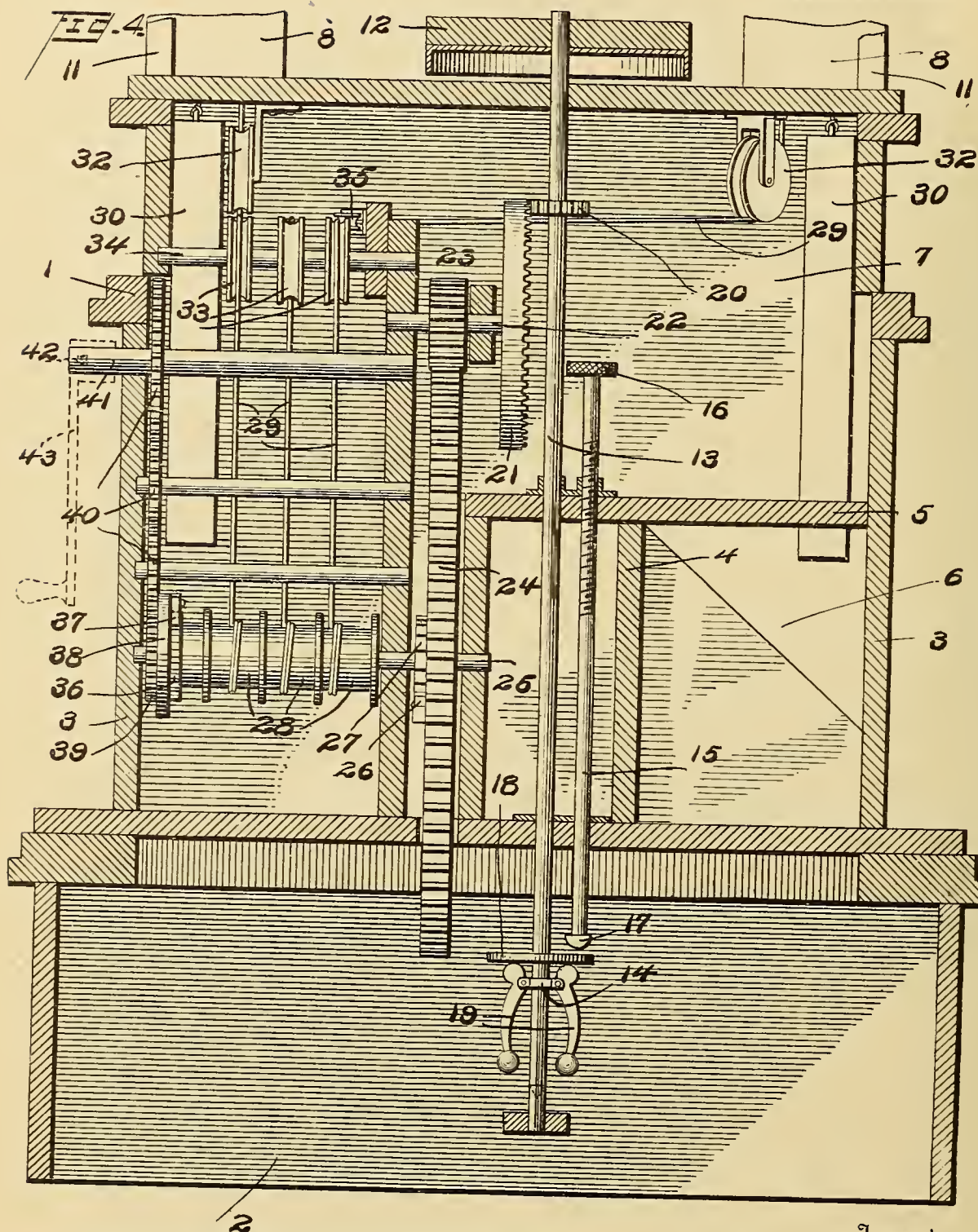




1,104,935.

C. RUPPEL.  
TALKING MACHINE.  
APPLICATION FILED OCT. 27, 1913.

Patented July 28, 1914.  
3 SHEETS—SHEET 2.



Witnesses

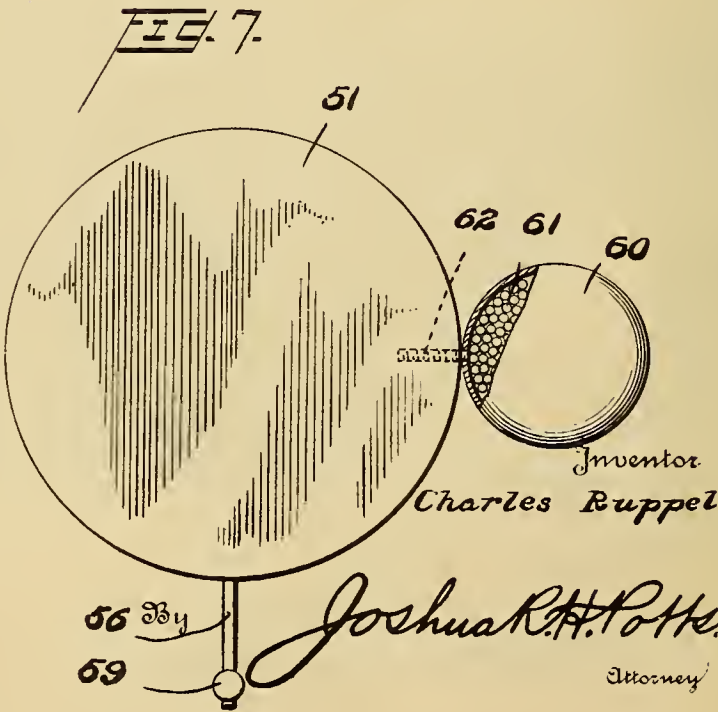
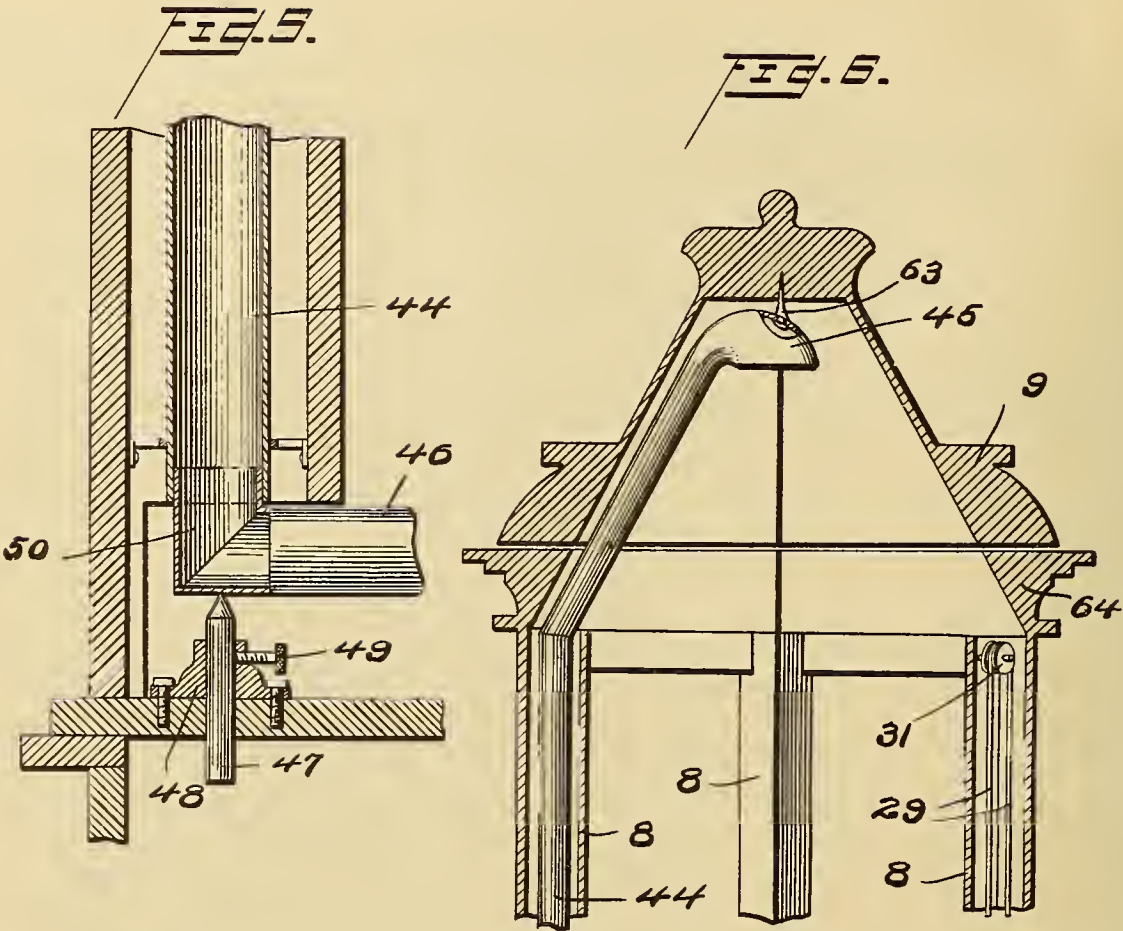
Harold Stanes  
C. R. Ziegler.

Inventor  
Charles Ruppel

334 Joshua R. H. Potts.  
Attorney







Witnesses  
*H. Straus*  
*E. R. Ziegler.*

By *Joshua R. H. Potts.*  
 56  
 59 Attorney

# UNITED STATES PATENT OFFICE.

CHARLES RUPPEL, OF PHILADELPHIA, PENNSYLVANIA.

## TALKING-MACHINE.

1,104,935.

Specification of Letters Patent.

Patented July 28, 1914.

Application filed October 27, 1913. Serial No. 797,538.

*To all whom it may concern:*

Be it known that I, CHARLES RUPPEL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking machines, and more particularly to a machine of this type which dispenses with the horn and in lieu thereof directs the sound downwardly through an open dome.

A further object is to provide an improved talking machine with improved means for driving the turn table and having improved means for regulating the speed thereof.

A further object is to provide a talking machine with a sound box having rotary mounting, and which is provided with a weight adapted to hold the needle or stylus in proper engagement with the record, and which weight may be utilized as a handle to turn the sound box and lift the needle or stylus from the record.

A further object is to provide an improved construction of cabinet which may be utilized as a storage for records and a housing for the motor as well as presenting an ornamental and attractive appearance.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a view in side elevation illustrating my improvements. Fig. 2 is a view in cross section on an enlarged scale on the line 2—2 of Fig. 1. Fig. 3 is a fragmentary view in elevation showing the rear of the cabinet with the doors open to illustrate the gearing within the cabinet. Fig. 4 is a view in vertical section on the line 4—4 of Fig. 3. Fig. 5 is a fragmentary sectional detail view illustrating the manner of pivotally supporting the sound box arm. Fig. 6 is a diagonal sectional view through the dome of the cabinet, and Fig. 7 is a view in elevation of the sound box showing its attached weight partly in section.

1 represents my improved cabinet which is supported upon a base 2. The lower rectangular portion 7 of the cabinet is provided at all four sides with hinged doors 3, so that

access may be readily had to the interior thereof.

A space inclosed by the doors 3 houses my improved weight motor, and is also divided by vertical and horizontal partitions 4 and 5 so as to provide a chamber 6 in which records are stored.

On top of the lower rectangular portion 7, four hollow standards 8 are located and support at their upper ends, an ornamental frame 64 above which is located a dome 9. A turn table compartment 10 is formed on the top of the lower rectangular portion 7, and is provided at all four sides with hinged doors 11 so that access may be readily had to the compartment.

In the turn table compartment 10, a circular turn table 12 is located and is secured upon the upper end of a vertical shaft 13 which extends through the rectangular portion 7, and is provided at its lower end with a governor 14 to regulate the speed of the turn table. This governor 14 is adjusted by means of a vertical screw-threaded rod 15 which has a milled head 16 on its upper end which may be manually turned to adjust the rod vertically. The rod 15 has a knob 17 on its lower end which is engaged by a disk 18 on the governor as the arms 19 of the latter swing outwardly so as to limit the speed of the shaft.

A pinion 20 on shaft 13 is driven by a crown gear 21 on a short shaft 22, the latter having a pinion 23 thereon to mesh with a large driving gear 24 constituting the driving gear of my improved weight motor which will now be described. The gear 24 is loose on a horizontal shaft 25, but is provided with a spring-pressed pawl 26 in engagement with a ratchet wheel 27 on the shaft 25, so that said shaft 25 when turned in one direction will impart motion to the gear 24.

On the shaft 25, three drums 28 are secured, and three cords or other flexible connecting devices 29 are secured to and wound upon the respective drums. In three of the hollow standards 8, weights 30 are adapted to move vertically, and in the upper portions of these standards, pulleys 31 are provided over which the respective cords 29 pass. These cords 29 pass over idle pulleys 32 in the lower portions of the standards and thence around idle pulleys 33 on a shaft 34, and thence to the drums. An idle pulley 35 is interposed between one of the pulleys



34, at the end of the pulleys 32, to properly direct the cord to one of the standards as seen most clearly in Fig. 2. In other words, the pulleys are so arranged that the downward movement of the weights compels all of the cords to unwind from the drums, imparting a rotary motion to the shaft 25.

The cords 29 are wound upon the drums 28, and the weights elevated when my improved winding mechanism now to be described is operated. The shaft 25 is provided with a ratchet wheel 36 which is engaged by a spring-pressed pawl 37 on a disk 38 loose upon said shaft 25, but fixed to turn with a gear 39. This gear 39 is connected by a train of gearing 40 with a winding shaft 41, and the latter is provided with a key 42 to connect a crank arm 43 to the shaft, so that when the latter is turned, the train of gearing will be operated to turn the drums and wind the cords thereon, elevating the several weights. During this winding operation of the drums, the ratchet and pawl 26 and 27 permit the shaft 25 to be turned without transmitting motion to the driving gear 24. As above stated, three of the standards 8 are occupied by the weights 10. The fourth of these standards is occupied by a sound tube 44 which at its upper end extends into the dome 9, and is slightly enlarged as shown at 45. The enlarged end of the tube 44 has an upwardly projecting pin 63 on which the dome 9 is supported and the standards 8 are occupied by the weights 30. The dome serves to amplify the sound and throw the sound waves downwardly and outwardly, softening the tones and distributing the sound uniformly in all directions.

The sound box arm 46 is pivotally supported at the lower end of the sound tube 44 by means of a journal 47 which bears against the lower face of the arm 46, and is adjustable in a bracket 48 by means of a set screw 49. It will be noted that the arm 46 has an upwardly projecting elbow 50 which extends into the sound tube 44, so that the arm 46 swings freely, the journal 47 and the extension 50 within tube 44 operating as a rotary mount for the arm. When it is desired to disconnect the arm, it is simply necessary to lower the journal 47 when the elbow 50 can be dropped down out of the tube 44.

On the free end of the arm 46, my improved sound box 51 is located. This sound box 51 is provided with a tube 52 having rotary mounting in the box as seen most clearly in Fig. 7. The tube 52 has an integral disk 53 and a removable disk 54 located within the sound box. One wall 55 of the sound box is located between these disks 53 and 54, so that while the parts are firmly held together, the tube 52 acts as a journal to allow the sound box rotary movement thereon. The tube 52 is connected to the

arm 46, and as said arm has no upward pivotal movement, the rotary mounting of the box allows the needle or stylus to be raised and lowered relatively to the record (not shown) on the turn table 12.

The sound box is provided with any approved stylus bar 56, having a set screw 59 therein to hold the stylus or needle in place.

On one side of the box 51, I locate a weight 60 which operates to hold the needle or stylus in proper engagement with the record. This weight 60 may constitute a hollow ball which may be filled with shot 61 to give it the proper weight. A screw 62 serves the double function of closing the opening in the ball and also connecting the ball with the sound box. The ball 60 therefore gives the proper weight to hold the needle on the record and also serves as a handle to permit the sound box to be revolved to lift the needle off the record.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A talking machine comprising a support, a sound tube projecting from the support, and a dome supported upon and hanging freely from the sound tube, substantially as described.

2. A talking machine comprising a support, a sound tube projecting from the support, a dome supported upon and hanging freely from the sound tube, said sound tube and dome directing the sound in the same direction, substantially as described.

3. A talking machine comprising a support, a sound tube projecting upwardly from the support and a dome pivotally supported on the sound tube, said sound tube having an outlet directing the sound downwardly within the dome, substantially as described.

4. A talking machine comprising a cabinet, a dome positioned over the cabinet, and a sound tube projecting upwardly from the cabinet and pivotally supporting the dome, said sound tube having an outlet directing the sound downwardly within the dome, substantially as described.

5. In a talking machine, the combination with a cabinet, four hollow uprights on the cabinet, a dome above the uprights, a sound tube projecting through one of the uprights and supporting the dome, and devices movable in the other of said uprights and adapted to operate sound producing means, substantially as described.

6. In a talking machine, the combination



with a cabinet, hollow uprights on the cabinet, a sound tube projecting through one of said uprights, a dome over the upper ends of the uprights and pivotally supported on the tube, and a sound box arm removably connected to the lower end of said tube and mounted to turn therein, substantially as described.

7. A talking machine comprising a cabinet, hollow standards on the cabinet, a dome above the standards, a turn table, and weights movable in certain of said standards and actuating means constructed to impart motion to the turn table, substantially as described.

8. A talking machine comprising a cabinet, hollow standards on the cabinet, a dome above the standards, a turn table, drums in the cabinet, means for imparting motion from the drums to the turn table, weights movable in certain of said standards, and flexible connecting devices between said weights and the drums, substantially as described.

9. A talking machine comprising a cabinet, four hollow standards on the cabinet, a dome above the upper ends of the standards, a turn table in the cabinet, a sound tube ex-

tending through one of the standards and discharging downwardly in the dome, a sound box arm having rotary connection with the tube and movable over the turn table, a sound box on said tube, and weights movable vertically in the other of said standards and adapted to turn the turn table, substantially as described.

10. A talking machine, comprising a cabinet, a sound tube extending upwardly from the cabinet and at its upper end constructed to discharge the sound downwardly, and a dome supported upon and hanging freely on the sound tube and inclosing the upper end thereof, substantially as described.

11. A talking machine comprising an upwardly projecting sound tube, means for directing sound into the lower end of the tube, an upwardly projecting pin on the upper portion of the sound tube, and a dome hung on said pin, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES RUPPEL.

Witnesses:

M. E. DITTUS,

CHAS. E. POTTS.



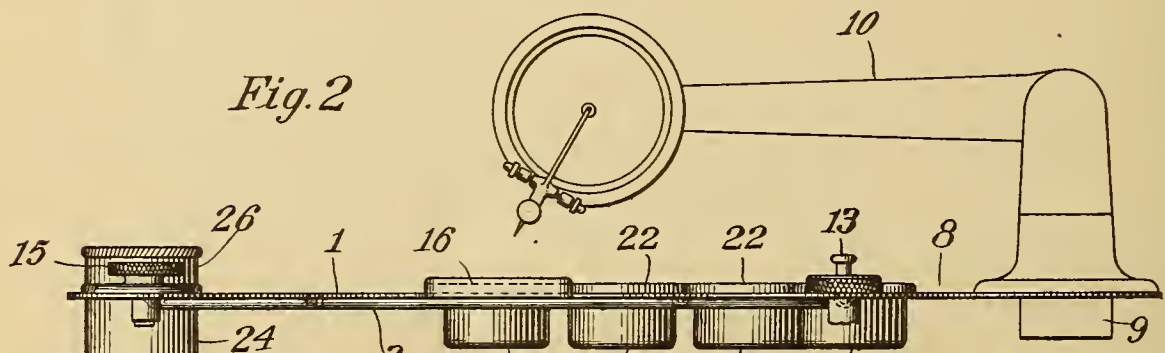
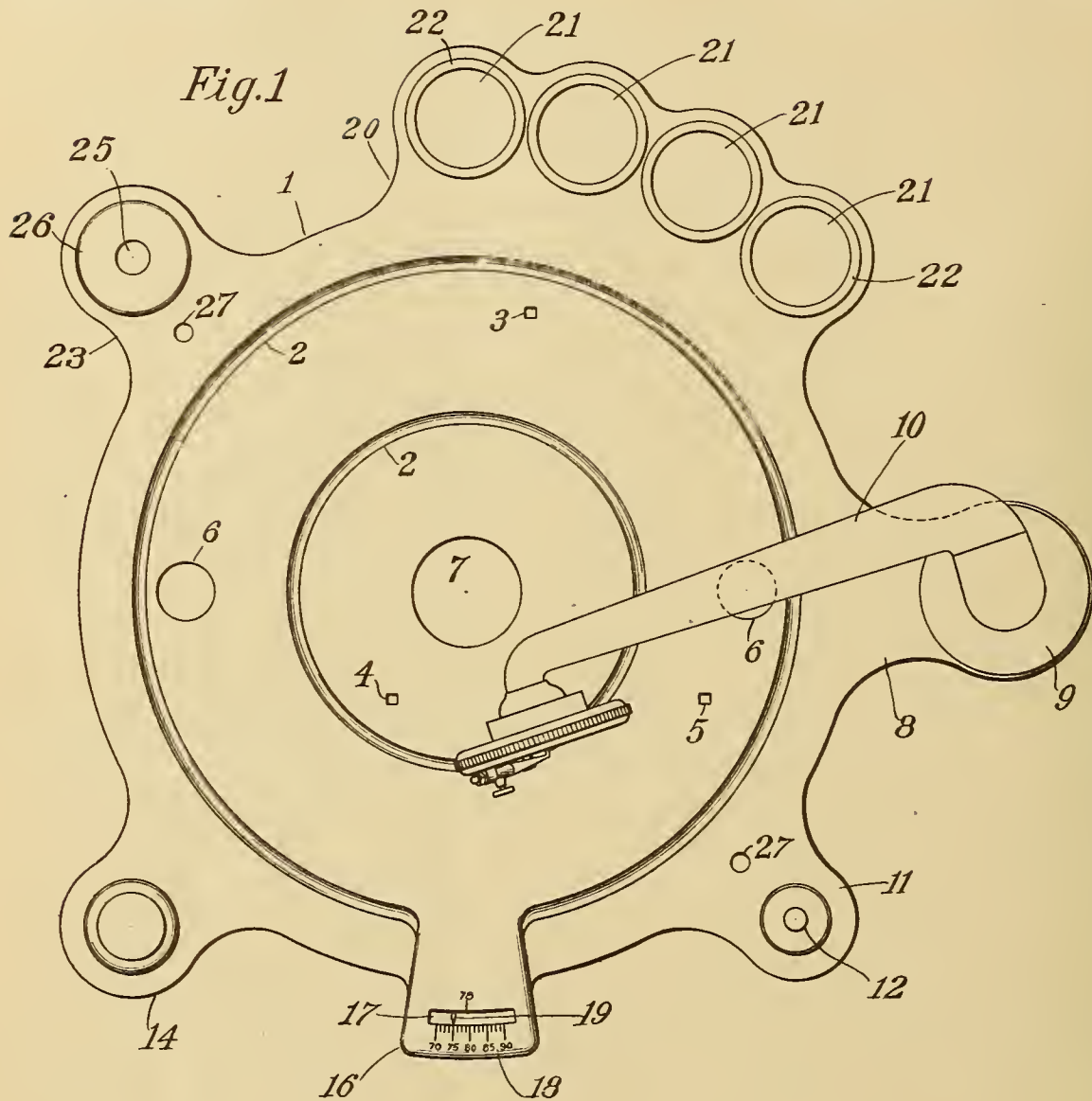




C. E. WOODS.  
TALKING MACHINE.  
APPLICATION FILED DEC. 4, 1912.

1,106,269.

Patented Aug. 4, 1914



Witnesses:  
Ruth C. Fitzhugh.  
Geo. H. Anderson.

Inventor  
Clinton E. Woods,  
By his Attorneys  
Mauro, Cameron, Lewis & Masie

# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## TALKING-MACHINE.

1,106,269.

Specification of Letters Patent.

Patented Aug. 4, 1914.

Application filed December 4, 1912. Serial No. 734,913.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to a single unitary motor-plate, standardized and interchangeable, intended primarily for use with talking-machines that employ disk sound-records and particularly adapted for use with talking-machines of the class known as "concealed-horn" or "cabineted" machines, although it may likewise be employed with so-called "visible-horn" machines. However, my invention is also applicable to talking-machines that employ cylindrical sound-records.

For convenience, I shall explain the invention with particular reference to disk machines of the "concealed-horn" type where the sound-conveyer extends downward and discharges beneath the level of the turn-table.

Heretofore, in assembling such machines and installing them in their cabinets, the motor has had to be mounted in a particular position, on or beneath a shelf or other suitable support; openings must be properly plotted and made for the main motor-shaft, for the motor-controlling devices, and particularly for the sound-passage (through the tone-arm into the horn), and particular pains are to be taken in order that all the various mechanical parts should be brought into proper relation to each other and to the cabinet. In each separate installation, these holes must be carefully located by skilled workmen; indeed, in the various styles and sizes of machines put out by the same manufacturer, the machine devices referred to have been located in a wide variety of different positions with respect to each other (and at different distances). In short, it has been a matter of considerable skill, requiring expert labor, to install the machines properly in the cabinets; and it sometimes happens that the installation turns out unsatisfactory, and requires taking apart and re-installing. All of this has proved very expensive, besides causing delays in the original assembling and in the test rooms. I have avoided all these diffi-

culties by producing a single unitary rigid motor-plate or talking-machine base,—a standardized product containing carefully located openings, bearings, etc., for use interchangeably with different styles of talking-machines. By means of my invention, such standardized motor-plates can be struck up from sheet steel, the motor can be mounted thereon in the factory, all the parts brought automatically into proper relation, and the whole installed in the cabinet by unskilled labor.

A preferred embodiment of my invention is illustrated in the annexed drawings, in which—

Figure 1 is a plan, and Fig. 2 an edge view, of a preferred motor-plate embodying my invention, shown as equipped with a swinging tone-arm and its sound-box and stylus.

The motor-plate 1 is of sheet steel, stamped up into substantially the configuration indicated, and preferably provided with stiffening-corrugations 2.

3, 4, and 5 represent openings for securing the depending motor, as by rivets, bolts, or other suitable means.

6—6 are conveniently-located finger-holes for lifting the plate with its dependent motor into or out of the talking-machine cabinet.

7 represents the central opening, through which will protrude the upright motor-shaft for carrying the turn-table of the talking-machine.

8 is a lateral projection for presenting, at suitable distance from the center 7, the opening in which is secured the stationary member 9 for the swinging tone-arm 10. At the proper distance from the extension 8 and from the motor is a small extension 11, having an opening 12, through which extends the stop-and-start button 13 (shown in Fig. 2) for the motor. At 14 is a similar extension having an opening for the speed-regulator 15 (Fig. 2). Intermediate the projections 11 and 14 is a projection 16 having the curved slot 17, adjacent to which is the scale 18, with which co-acts the pointer 19 of the speed-indicator.

20 is a conveniently-located projection for carrying a plurality of depressed cups 21, for holding reserve supplies of various styles of reproducing-needles (*e. g.*, "hard," "medium," "soft" and "fiber"). Pref-



erably, the metal is stamped up around the margin of each cup-opening, to produce the rims 22.

23 is still another conveniently-located projection from the plate 1, in which is stamped the opening for the cup 24 for used needles; such needles being dropped in turn through a little opening 25 in a detachable cup 26 fitted into the pressed-up flange 24 (similar to the flanges 22).

With my new motor-plate, the motor (whether a spring motor or an electric motor) is readily secured to the bottom of the plate 1, as by means of screws passing through the openings 3—5, as explained. This brings the start-and-stop mechanism in proper position for control by the button 13, which is readily put into place and connected up; this also brings the speed-controlling mechanism into position where the speed-regulator 15 can be readily inserted through its opening in projection 14, and properly connected up; and likewise brings the speed-indicator 19 into proper position where it can be seen beneath the slot 17. Finally, the tone-arm is properly secured over its hole in projection 8, which is so located as to bring the stylus into proper relation to the sound-record. All the mechanical parts being thus assembled upon my novel motor-plate as the base, the entire structure can be readily applied to any cabinet, and secured in place as by screws passing through suitably located holes 27. This latter installing can be carried out in the cabinet-making department, by unskilled labor.

It will be understood that some of the projections (with their cups or openings) may be omitted, or additional projections

with openings or cups provided; and that the relative locations of the respective projections and openings, or the distance of each from the center, can be varied, according to the type and size of motor, or the particular construction intended to be employed, without in any case departing from the spirit of my invention. In short, my invention is not limited to the precise construction and arrangement of parts, but may be varied considerably.

Having thus described my invention, I claim:

1. A sheet metal motor-board for talking machines, having an approximately circular body portion, with a centrally placed motor-shaft opening therein, and two marginal projections through one of which is a tone-arm opening, and through the other of which there is an oblong slot or opening with a speed-indicating scale adjacent thereto.

2. A sheet metal motor-board for talking machines, having an approximately circular body portion, with a centrally placed motor-shaft opening therein, strengthening corrugations concentric with said motor-shaft opening, and marginal projections from said circular body portion having openings to accommodate the tone-arm, speed-regulator and a start-and-stop element.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,  
JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

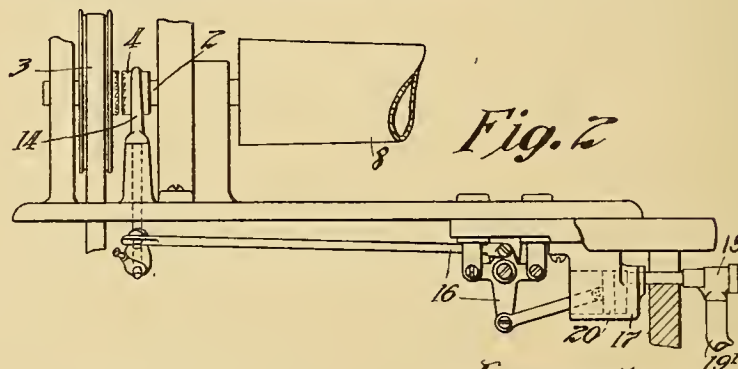
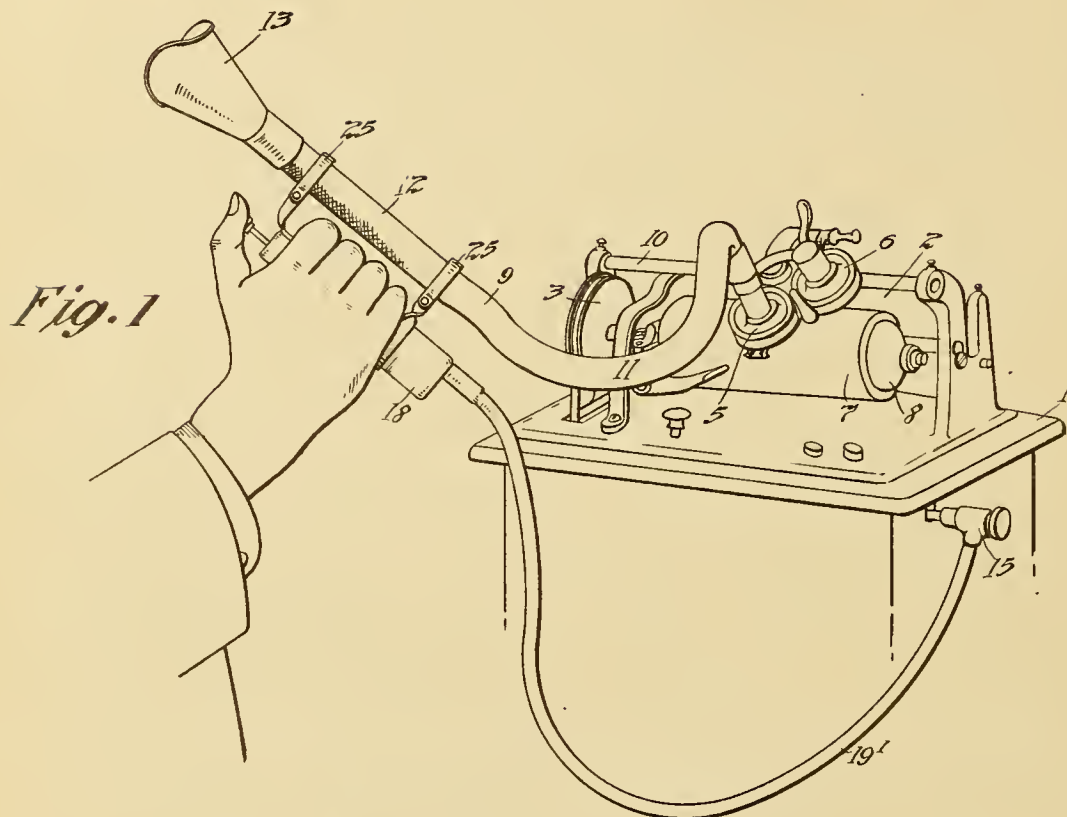




N. C. DURAND.  
CONTROLLING DEVICE.  
APPLICATION FILED MAY 15, 1912.

1,106,443.

Patented Aug. 11, 1914



*Witnesses:*  
*W. A. Hardy.*

*Inventor:*  
*Nelson C. Durand,*  
*by Frank L. Hyer*  
*His Atty.*

# UNITED STATES PATENT OFFICE.

NELSON C. DURAND, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## CONTROLLING DEVICE.

1,106,443.

Specification of Letters Patent.

Patented Aug. 11, 1914.

Application filed May 15, 1912. Serial No. 697,422.

*To all whom it may concern:*

Be it known that I, NELSON C. DURAND, a citizen of the United States, and a resident of the city of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Controlling Devices, of which the following is a description.

My invention relates to controlling devices and especially to controlling devices for business or other phonographs.

The objects of my invention are to provide improved, simple, and efficient means for controlling the starting and stopping of phonograph or other mechanisms; and to provide controlling devices for a phonograph having means serving as a handle for the sound conveyer thereof, whereby the sound conveyer may be supported in and moved to any desired position, and the controlling device may be actuated, by the hand of the operator.

More specifically described my invention comprises pneumatic means preferably consisting of two pumps connected by flexible tubing, one of the pumps being preferably connected to a clutch between the driving and driven mechanism of a phonograph and the other pump being preferably connected to the sound conveyer of the phonograph and serving as a handle therefor, the sound conveyer being preferably formed with a flexible portion.

In order that my invention may be more clearly understood, attention is directed to the accompanying drawings, forming a part of this specification in which the same reference characters are used to designate corresponding parts throughout and in which:

Figure 1 is a view in perspective showing a phonograph with my invention applied thereto; Fig. 2 is a front elevation, partly broken away, of the driving and driven mechanism of a phonograph, the clutch between the driving and driven mechanisms, and the means for controlling the clutch; and Fig. 3 is an elevation, partly in section, of the actuating pump of the controlling device which serves as a handle for the sound conveyer.

Referring to the drawings, reference numeral 1 designates a phonograph comprising the phonograph mechanism 2 and the driving mechanism 3. The phonograph mechanism is adapted to be driven by the driving mechanism 3 through a clutch com-

prising a shiftable clutch member 4. Movement of the clutch member 4 in one direction or the other serves to connect and disconnect the driving and phonograph mechanisms. The phonograph is provided with the usual sound box carrier arm or carriage on which are pivotally mounted the reproducer 5 and recorder 6 forming parts of the phonograph mechanism and either of which is adapted to be brought into operative position with respect to the record blank 7 carried by the mandrel 8.

Reference character 10 represents the usual guide rod for the sound box carrier arm or carriage. One end of a sound conveyer 9 is adapted to be slipped over the neck of either the recorder or reproducer. The sound conveyer preferably comprises an intermediate flexible portion 11 and an outer rigid portion 12 terminating in a bell or mouth piece 13. I provide suitable means for controlling the position of clutch member 4 and thus the stopping and starting of the phonograph mechanism which means preferably comprises a bell crank lever 14 having a loose connection with the clutch member 4, a pneumatic device and suitable connections 16 between the bell crank 14 and the pneumatic device. The pneumatic device preferably consists of a pump 17 mounted on the phonograph frame, a second pump 18, and means connecting the pumps comprising a flexible tube 19' connected at one end with the pump 18 and a detachable connection 15 between the other end of the tube 19' and pump 17. The piston 20 of the pump 17 is connected by the connections 16 to the bell crank lever 14, and this piston is adapted to be moved to actuate the connections 16, bell crank lever 14, and clutch member 4 by the changes in pressure in the column of fluid in the tube 19'.

Referring to Fig. 3, the pump 18 preferably comprises a hollow member 19 having a preferably enlarged portion forming a cylinder 20' and an elongated portion 21, a spring pressed piston 22 in the cylinder 20', and a rod 23 connected to said piston and extending out through the end of the elongated portion 21, and having a button or thumb-piece 24 on its outer end. The elongated portion 21 of pump 18 is of such a size as to be gripped or held by the hand of the operator while allowing the operator to actuate the rod 23 by his thumb as shown



in Fig. 1. The pump 18 is preferably rigidly connected to the rigid portion 12 of the conveyer to serve as a handle therefor by any suitable means, as by brackets 25.

5 When not in use the sound conveyer and pump 18 will depend from the phonograph, but when it is desired to use the phonograph the operator grasps the handle or elongated portion 21 of pump 18, moves the sound conveyer 9 to the desired position, and presses  
10 on the button 24 to start the phonograph mechanism. On applying pressure to the button 24, piston 22 will be forced inwardly against the spring 26 and compress the fluid  
15 in tube 19' and thus actuate the piston 20 of the pump 17, connections 16, and bell crank lever 14 to shift the clutch member 4 into a position to operatively connect the driving mechanism 3 and phonograph mechanism 2. Upon release of the pressure on  
20 button 24 spring 26 will force the piston 22 to the position shown in Fig. 3, and suction will cause piston 20, connections 16, bell crank lever 14, and clutch member 4 to assume the positions shown in Fig. 2, and disconnect the driving and phonograph mechanisms.

Although I have illustrated my improved controlling device as applied to a phonograph it will of course be understood that it  
30 may be adapted for use in numerous other devices.

Having now described my invention, what I claim and desire to protect by Letters Patent is:

35 1. In a device of the class described, the combination with phonograph mechanism and operating means therefor, of a sound conveyer having a mouth piece and connected to the phonograph mechanism, and a device applied to said sound conveyer and comprising a member constituting a handle,  
40 said handle being offset or spaced from the sound conveyer to enable the same to be grasped by the hand and being provided with controlling means for said operating means, substantially as described.

2. In a device of the class described, the

combination with phonograph mechanism and operating means therefor, of a sound conveyer having a mouth piece and connected to the phonograph mechanism, and a device applied to said sound conveyer and comprising a member constituting a handle,  
55 said handle being offset or spaced from the sound conveyer to enable the same to be grasped by the hand, said member being provided with controlling means for said operating means in a position adapted to be operated by the thumb, substantially as described.

3. In a device of the class described, the combination with phonograph mechanism and operating means therefor, of a sound conveyer having a mouth piece and connected to the phonograph mechanism, and a device applied to said sound conveyer and comprising a member constituting a handle,  
65 said handle being offset or spaced from the sound conveyer to enable the same to be grasped by the hand, said member being provided with pneumatic controlling means for said operating means, substantially as described.

4. In a device of the class described, the combination with phonograph mechanism and operating means therefor, of a sound conveyer having a mouth piece and connected to the phonograph mechanism, and a controlling device for said operating means applied to said sound conveyer, said device comprising a tubular member constituting a handle, said handle being offset or spaced  
80 from the sound conveyer to enable the same to be grasped by the hand, and a plunger member mounted within said tubular member and extending beyond one end thereof in a position adapted to be operated by the thumb, substantially as described.

This specification signed and witnessed  
90 this 10th day of May 1912.

NELSON C. DURAND.

Witnesses:

WILLIAM A. HARDY,

ANNA R. KLEHM.

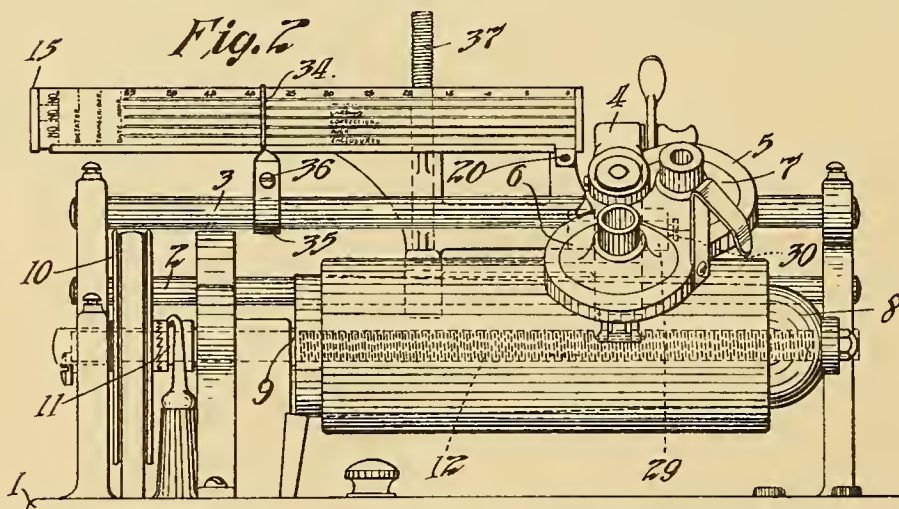
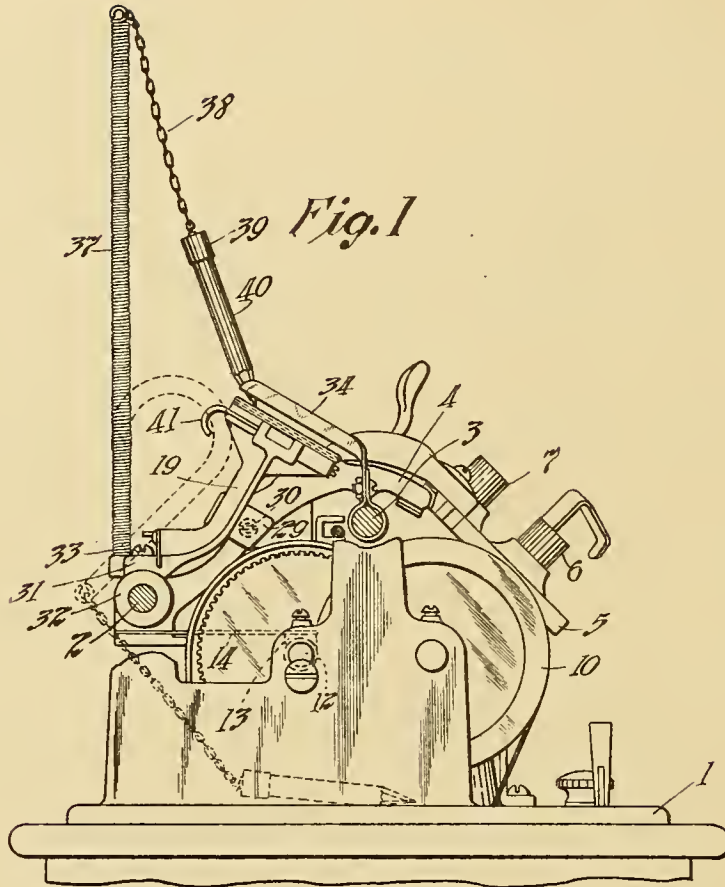


N. H. HOLLAND.  
 PHONOGRAPH.  
 APPLICATION FILED DEC. 2, 1911.

1,106,448.

Patented Aug. 11, 1914.

2 SHEETS—SHEET 1.



Witnesses:  
*Frederick Bachmann.*

Inventor:  
 Norman H. Holland,  
 by Frank L. Allen,  
 His Atty.

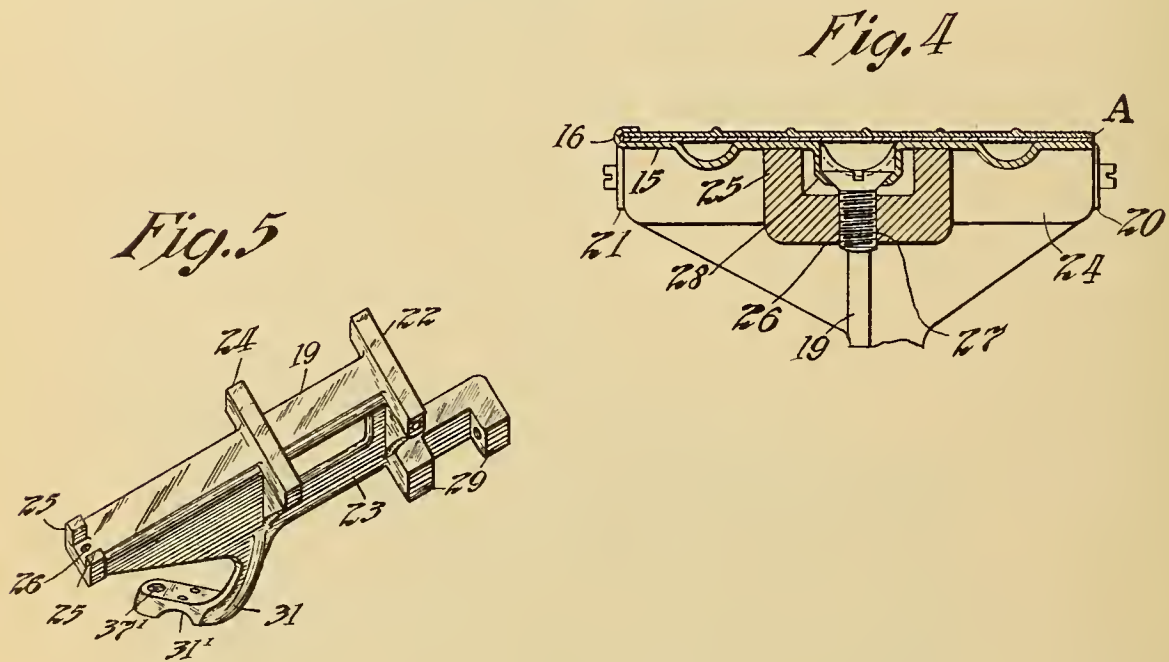




N. H. HOLLAND.  
 PHONOGRAPH.  
 APPLICATION FILED DEC. 2, 1911.

1,106,448.

Patented Aug. 11, 1914.  
 2 SHEETS—SHEET 2.



Witnesses:  
*Edw. Droske*  
*Frederick Bachmann*

Inventor:  
*Newman H. Holland*  
 by *Frank E. Dyer*  
*his Atty.*

# UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,106,448.

Specification of Letters Patent.

Patented Aug. 11, 1914.

Application filed December 2, 1911. Serial No. 663,558.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to memorandum attachments for such machines.

My principal object is to provide a new and improved device of this character by which instructions may readily be indicated for any desired part of the record. In conformity with this object, I provide a memorandum holder and a straight edge extending across the face of the holder, these parts being so connected to the fixed parts of the phonograph and the sound box support as to move relatively to each other at a speed corresponding with that of the recorder or reproducer across the record surface. I also provide a resilient pencil or marker support adapted to hold the pencil in convenient position for marking upon a memorandum carried by the memorandum holder or of being depressed, if necessary, so as to permit the placing of the cover upon the phonograph. In my preferred construction, I provide retaining means adapted to engage the resilient pencil support to hold the same in depressed position.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 represents a side elevation of a phonograph embodying one form of my invention; Fig. 2 represents a front elevation thereof; Fig. 3 represents a plan view of my improved memorandum holder with a memorandum sheet therein; Fig. 4 represents a cross section taken on the line 4—4 of Fig. 3; and Fig. 5 represents a perspective view of the bracket for connecting the memorandum holder to the sound box support or carrier arm of the phonograph.

In all of the views, like parts are designated by the same reference characters.

The phonograph shown is of the Edison type, and comprises the usual body 1 having a back rod 2 and a guide rod 3, on which rods the traveling carriage 4 is slidably mounted. Pivotaly mounted on the forward end of the carriage 4 is a frame 5 supporting a recorder 6 and a reproducer 7, the pivotal movement of this frame permitting either the recorder or the reproducer to be brought into operative position. As shown in Figs. 1 and 2, the frame 5 is in position for recording. The mandrel 8 is mounted on the main shaft 9 which is adapted to be driven from the pulley 10 when operatively connected thereto by the clutch 11, rotation being imparted to the pulley 10 by the phonograph motor (not shown).

The numeral 12 represents a feed screw which is adapted to be engaged by a nut 13 supported from the traveling carriage 4 by a spring 14 to feed the said carriage along the rod at the desired speed.

My improved memorandum attachment comprises a platen 15 provided along the forward edge thereof with an inwardly directed flange 16 and along the lateral edges with inwardly directed flanges 17 and 18, these flanges serving, as shown in Fig. 3, to retain a memorandum sheet A in position on the platen. The platen 15 is secured to the traveling carriage of the phonograph by means of a bracket 19, the platen being preferably provided adjacent one end thereof with downwardly directed flanges 20 and 21 adapted to be secured to the ends of an arm 22 extending across one end of the bracket. The latter, as shown at 23, is provided with a web-like portion extending longitudinally of the platen 15. Intermediate the ends thereof, the bracket is formed with an arm 24 extending transverse to the web 23 and adapted to support the bottom of the said platen intermediate the ends thereof. At the end of the bracket opposite that having the arm 22 are two spaced vertical projections 25. The portion of the bracket between these projections is formed with a screw threaded recess 26 adapted to receive a screw 27, which passes through and bears upon the bottom of the cup-like portion 28 of the platen 15 to assist in holding the latter in position on the bracket. At the end thereof adjacent the arm 22, the bracket is provided with a fork-like portion



29 adapted to straddle the carrier arm 4 as shown in Fig. 1, a screw 30 passing through one of the arms of this portion of the bracket serving to secure the same to the said arm. Substantially midway of the length thereof, the bracket is provided with the rearwardly directed arm 31 adapted to engage the tubular extension 32 of the carrier arm. The arm 31 is preferably provided with a recess 31' to enable the same to fit closely over the extension 32 and is secured to the said extension, as by one or more set screws 33.

A straight edge 34 preferably formed of a strip of resilient sheet metal looped about the guide rod 3, as shown at 35, and clamped thereto as by a set screw 36, extends across the face of the platen 15. The portion of the said arm extending across the platen is preferably twisted to a vertical position, as shown in Figs. 1 and 2.

My improved pencil support preferably comprises a spiral spring 37 forming a resilient rod or arm threaded into a threaded aperture 37' in the bracket 19 so as to extend vertically upward on the phonograph. This arm carries at its upper end a chain 38 carrying a socket 39 or any other suitable means for holding a pencil 40 in convenient position with respect to the platen. As shown in the drawings, the pencil is maintained by the arm 37 in a position adjacent the upper end of the platen, from which position it may readily be drawn across the straight edge 34 to mark a memorandum placed upon the platen. When released after this operation, it will be moved by the arm 37 to its normal position. A support such as the spring 37 may be easily depressed when it is desired to place the cover of the phonograph in position upon the machine; and I preferably secure to the bracket 19 a curved finger or hook 41 adapted to retain the spring rod 37 in depressed position, as shown in dotted lines in Fig. 1.

Numerous types of memorandum forms may obviously be used with my invention, but for convenience of illustration, I have disclosed a form invented by Nelson C. Durand, and described and claimed by him in an application, Serial No. 663,566, filed on even date herewith. This form is provided with a representation 42 of the scale commonly employed upon commercial phonographs, under which scale are a number of spaces extending parallel to the scale and provided with printed stock phrases designating the instructions to be noted. At one end of this form are a number of spaces for designating the record and any other desired information. In using my invention, the memorandum sheet is fed past the straight edge 34 at a rate equal to the movement of the recorder or reproducer across the record surface. If, therefore, the dictator draws

the pencil 40 across the straight edge 34 and marks the memorandum in the proper longitudinal space, for example, that marked "Corrections", while the recorder is at the part of the record for which the instructions are to be given, these instructions and the part or parts of the record to which they refer will be clearly indicated to the transcriber by the marked memorandum sheet. The phonograph of the transcriber should preferably also be provided with a memorandum attachment similar to that described above for receiving the marked memorandum sheet, so that the approach of the straight edge and the mark or marks on the sheet will vividly indicate in advance the part of the record to which reference is made by the memorandum. If for example, as stated above, the sheet is provided with a mark indicating that corrections are to be made in a particular part of the record, the transcriber, by the approach of the straight edge and the said mark, will be advised to listen for corrections to be made.

My invention is obviously capable of considerable modification and I wish it, therefore, to be understood that I am not limited to the exact details shown and described.

What I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a device of the class described, the combination with a phonograph having a rotatable record support, a carrier arm or sound box support, and means for uniformly progressing said sound box support across said record support, of a memorandum holder, a bracket for detachably securing said holder to said carrier arm, the said bracket having a yoke-shaped portion straddling and secured to the said arm, and a stationary straight edge detachably secured to said phonograph in proximity to the upper face of said holder, substantially as described.

2. In a device of the class described, the combination with a phonograph having a rotatable record support, a back rod, a guide rod, a sound box carrier arm slidably mounted on said guide rod and having an extension mounted on said back rod, and means for uniformly progressing said sound box support across said record support, of a memorandum holder, a bracket for detachably securing said holder to said carrier arm, and a straight edge detachably secured to said guide rod, in proximity to the upper face of said holder, the said bracket having a yoke-shaped portion straddling and secured to said arm, and a second portion resting upon the extension of the carrier arm, substantially as described.

3. In a device of the class described, the combination with a phonograph having a rotatable record support, a carrier arm or



sound box support, and means for uniformly progressing said sound box support across said record support, of a memorandum holder, a bracket for detachably securing  
5 said holder to said carrier arm, and a stationary straight edge secured to said phonograph in proximity to the upper face of said holder, and extending over substantially the full width of the same, substantially  
10 as described.

4. In a device of the class described, the combination with a phonograph having a rotatable record support, a sound box support, and means for producing a relative  
15 feeding movement between said supports, of a holder carrying a memorandum sheet having indicating spaces extending longitudinally thereof, and a straight edge located in proximity to said holder and extending  
20 over substantially the full width of the indicating spaces of said memorandum sheet, the said holder and straight edge being connected with said phonograph for relative movement proportionately to the relative  
25 movement between said record and sound box supports, substantially as described.

5. In a device of the class described, the combination with a phonograph having a rotatable record support, a carrier arm or  
30 sound box support, and means for uniformly progressing said sound box support across said record support, of a holder secured to said sound box support and carrying a

memorandum sheet having indicating spaces extending longitudinally thereof, and a stationary straight edge secured to said phonograph in proximity to said holder and extending over substantially the full width of the indicating spaces of said memorandum sheet, substantially as described.  
35  
40

6. In a device of the class described, the combination with a phonograph having a rotatable record support, a sound box support, and means for producing a relative feeding movement between said supports, of  
45 a holder carrying a memorandum sheet and provided with inwardly directed flanges for retaining the memorandum sheet thereon, said memorandum sheet having indicating spaces extending longitudinally thereof, and  
50 a straight edge located in proximity to said holder and extending over substantially the full width of the indicating spaces of the memorandum sheet, the said holder and straight edge being connected with said  
55 phonograph for relative movement proportionately to the relative movement between said record and sound box supports, substantially as described.

This specification signed and witnessed  
60 this 29 day of November 1911.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.





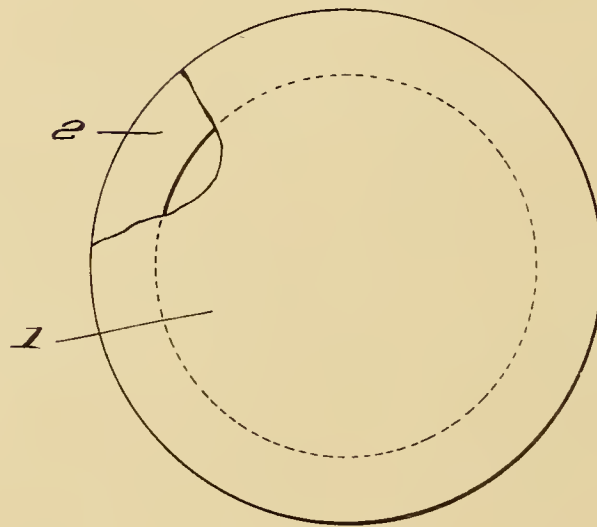


L. S. LACHMAN.  
ART OF STRETCHING SHEET MATERIAL.  
APPLICATION FILED JUNE 9, 1910.

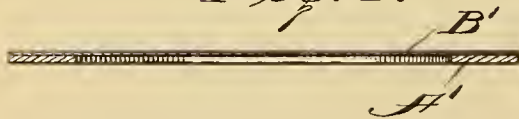
1,106,516.

Patented Aug. 11, 1914.

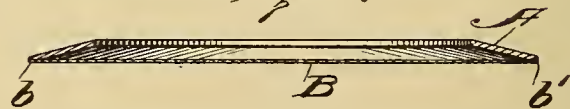
*Fig. 1.*



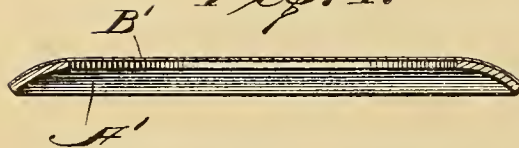
*Fig. 3.*



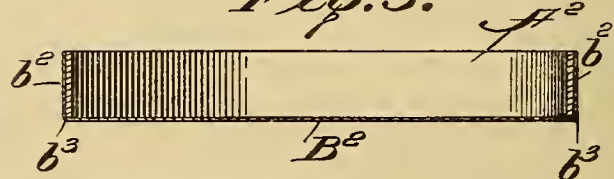
*Fig. 2.*



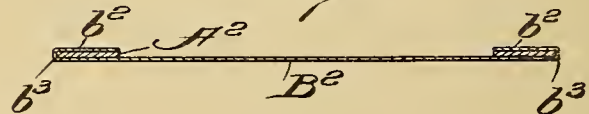
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



Witnesses:  
*L. Richards*  
*A. C. O'Connell*

*L. S. Lachman, Inventor*  
*By his Attorney, W. A. Myrath*

# UNITED STATES PATENT OFFICE.

LAURENCE S. LACHMAN, OF NEW YORK, N. Y.

## ART OF STRETCHING SHEET MATERIAL.

1,106,516.

Specification of Letters Patent.

Patented Aug. 11, 1914.

Application filed June 9, 1910. Serial No. 566,052.

*To all whom it may concern:*

Be it known that I, LAURENCE S. LACHMAN, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in the Art of Stretching Sheet Material, of which the following is a specification.

This invention relates broadly to certain improvements in the art of stretching sheet materials, forming the body of a reinforced object.

It more specifically relates to certain improvements in diaphragms, adaptable for use in phonographs, telephones, etc., and to the art of producing the same, and for this reason it is particularly illustrated, and will be particularly herein described, with reference to diaphragms. It is to be understood, however, that in its broader aspects it is not to be construed as restricted to such diaphragms, and that the latter is selected for illustrative purposes and because of peculiar advantages which the process and product possesses in their relation to said particular class of devices.

The invention consists broadly of a process of producing an article having a body of stretched material and a reinforcing frame, comprising the steps of securing the body and frame together and subjecting the frame to pressure which stretches the body; and to the product thereof.

The invention also consists in producing articles having reinforced peripheral portions and a body of sheet material comprising the steps of securing to each other, in a proper relation, a frame forming such reinforcement, and a body of suitable sheet material, and then stretching the latter by means of pressure adapted to change the form of the frame and to cause it while undergoing such change to transmit to the body a pulling force tending to disrupt the same.

The invention further consists in the product of such process.

The invention also consists in a diaphragm for phonographs, telephones or analogous apparatus or devices, consisting of a body of stretched sheet material, as metal, celluloid, etc., having a reinforced edge; and further in a process of producing the same

by subjecting the body to stretching strain imposed thereon by alteration of the shape of the frame element.

These, and other ends, of the invention are well accomplished by the embodiments of my invention, illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view of a completed diaphragm produced in accordance with my invention, with a part of the material of the body broken away. Fig. 2 is a vertical sectional view illustrating an initial position of the body and frame. Fig. 3 is a similar sectional view illustrating an initial position of the parts when the frame is of one different form from that of Fig. 2. Fig. 4 is a sectional view through a diaphragm produced from the parts illustrated in Fig. 3. Fig. 5 is a similar view illustrating an initial position of the parts when the frame has still another form; and Fig. 6 is a similar view illustrating the completed diaphragm when the frame of Fig. 5 is employed.

The body element, marked 1 in Fig. 1, may be of any suitable sheet material, shape and size, and the frame, marked 2 in the same figure, similarly may be of any suitable material and size, and of any suitable open form. For diaphragms for phonographs or telephones, it is preferred that the body of sheet steel, though other sheet metal and even materials, such as celluloid, which are capable of being stretched or expanded by the process hereinafter set forth and are properly responsive when stretched to the vibrations of a sound recording or reproducing tool of a phonograph, or to the sound waves or electrical impulses of a telephone receiver or transmitter, may be employed if desired. Preferably, the body is of circular form and the frame of annular form.

In the practice of the process, the frame is first mounted on the body in a suitable relation therewith and, after they have been rigidly secured together so that outward movement of the frame at its place or places of contact with the body will tend to disrupt the latter, pressure adapted to change the form of the frame is applied, said frame during said change obviously stretching said body tightly within the frame.

Referring now to the several forms ex-



emplifying various embodiments of my invention:—Fig. 2 illustrates a form in which the frame marked A is primarily a dish-shaped annulus having its outer peripheral edge superimposed on the body, marked B, contiguous to the peripheral edge of the latter, and secured thereto at  $b$ . In the practice of this particular embodiment of the process, the frame is pressed down until its under surface is in contact with the upper surface of the body, the latter retaining its flat shape. In its described movement, it obviously exerts outward pressure on the body, pulling the latter uniformly at all points around its periphery, thereby stretching it to a substantially uniform extent throughout.

In the embodiment shown in Figs. 3 and 4, the primary shape of the frame, marked  $A'$ , is that of a flat ring, and the primary shape of the body, marked  $B'$ , is that of a flat disk. When these parts are superimposed, with the contiguous surfaces in contact and suitably secured together, pressure is applied which changes the shape of the frame to that of a dish-shaped annulus, the shape of the outer portion of the body being similarly changed and thereby becoming stretched within the limits defined by the inner peripheral edge of the frame.

In the form shown in Figs. 5 and 6, the primary shape of the frame, marked  $A^2$ , is that of a vertically disposed ring superimposed edgewise on the surface of the body, marked  $B^2$ , and said body has a peripheral flange  $b^2$  which encircles the outer surface of the ring and is suitably secured thereto. In the practice of the process this ring is flattened down toward the body, stretching the latter by exerting outward pressure upon the angle  $b^3$ .

The contacting portions of the body and frame, particularly the forms shown in Figs. 2, 3 and 4 are preferably integrally secured together, as by welding, electrically or otherwise, by brazing, or by soldering, electric welding being preferred. This is also true of the contacting portions of the body and frame of Figs. 5 and 6, but is not so important with respect to the latter form as the engagement of the flange of the body forms a securing means which is more or less effective in holding the parts together both during the formation of the articles and after the latter have been formed.

It is believed that my invention will be fully comprehended from the foregoing, and that it will be seen that it produces important advantages in the art of stretching metal and particularly in the art of producing diaphragms, as well as in the diaphragms themselves.

While I have shown the elements A,  $A'$  and  $A^2$  separate from the elements B,  $B'$  and

$B^2$ , respectively, it is to be understood that said elements may be an integral part thereof, the thickened part to be formed in any desirable way as an integral part of said diaphragm or element B,  $B'$  or  $B^2$ .

While the device as illustrated is in the form of a disk, it is to be understood that it may also be in any other desirable shape.

Having now described the invention what I believe to be new and desire to secure by Letters Patent, is:

1. The process herein described, which comprises the steps of rigidly and permanently securing an open frame and a sheet of expansible material together and subjecting the frame to pressure to change its shape and stretch the sheet.

2. The process herein described, which comprises the steps of securing an open frame and a sheet of expansible material together, and subjecting the frame to pressure which changes its form and causes it while assuming the new form to stretch the sheet.

3. The process herein described, which comprises the steps of permanently securing together a sheet of suitable material and a reinforcing frame therefor, and subjecting the frame to pressure which changes its form and causes it while assuming the new form to stretch the sheet.

4. A process of making diaphragms, consisting of a body of sheet material and a reinforcing frame therefor, comprising the steps of permanently securing the sheet at its edges to the frame and first subjecting the frame to pressure to stretch the sheet.

5. A process of making diaphragms consisting of a stretched body of sheet material and a reinforcing frame therefor, comprising the steps of permanently securing the body and frame together and subjecting the frame to pressure which changes its form and stretches the sheet.

6. A process of making diaphragms consisting of a stretched body of sheet material and a reinforcing frame, comprising the steps of securing a dish-shaped reinforcing annulus to a body of sheet material, and subjecting the annulus to pressure which forces it toward the plane of the body and stretches the latter.

7. A process of making diaphragms, consisting of a stretched body of sheet material and a reinforcing frame, comprising the steps of securing a dish-shaped reinforcing annulus to a body of sheet material, subjecting the annulus to pressure which forces it toward the plane of the body into flatwise engagement therewith, and then subjecting the parts to further pressure which changes the form of their secured portions.

8. A process of making diaphragms consisting of a stretched body of sheet metal

and a reinforcing ring therefor, comprising the steps of permanently securing the body and ring together and subjecting the ring to pressure which changes its form and  
5 stretches the sheet.

9. A process of making diaphragms which comprises the steps of welding together contacting portions of a body of sheet metal and a frame and then subjecting the frame  
10 to pressure which stretches the body and

puts it into a reinforcing relation with the latter.

In witness whereof I have hereunto set my hand at New York, county of New York and State of New York, this seventh day of 15 June, 1910.

LAURENCE S. LACHMAN.

In presence of—

ISABEL R. RICHARDS,

JOHN J. RANAGAN.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



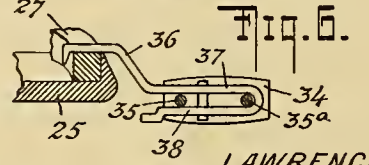
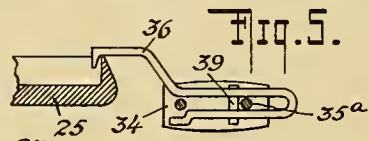
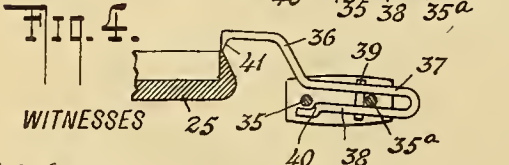
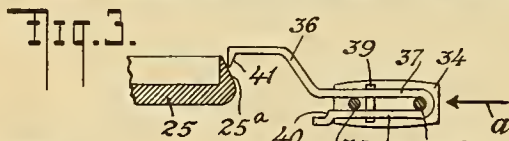
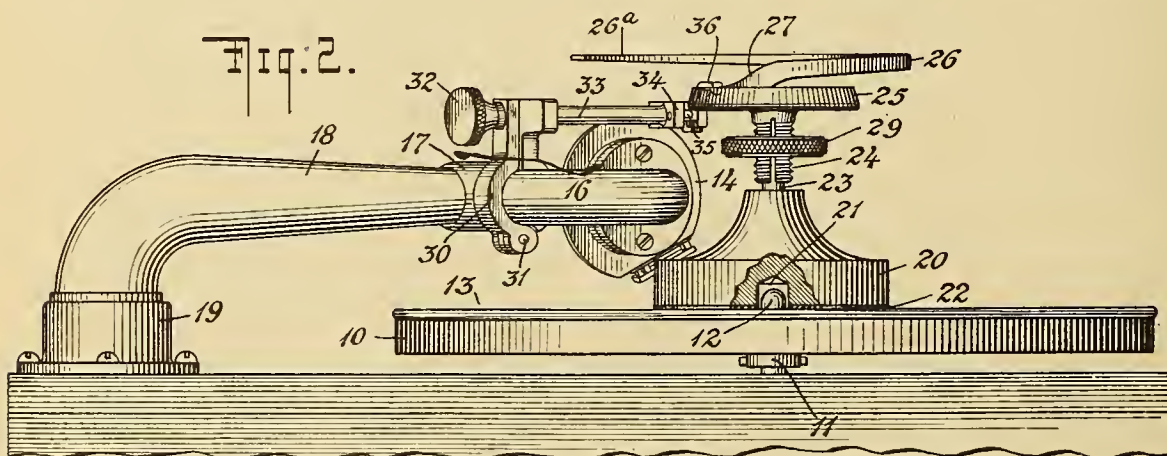
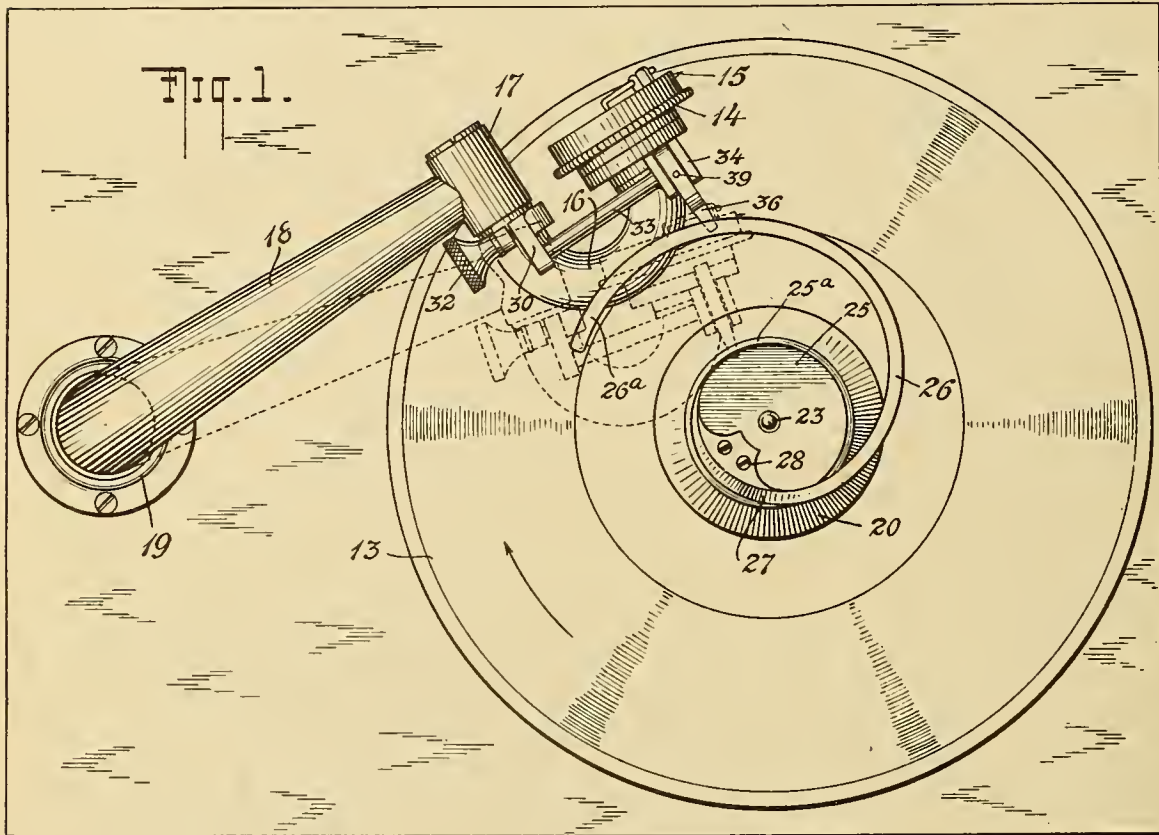




L. ABRAHAM.  
 REPEATING MECHANISM FOR TALKING MACHINES.  
 APPLICATION FILED MAR. 28, 1914.

1,107,242.

Patented Aug. 11, 1914.



WITNESSES  
 G. V. Rasmussen  
 John A. Schlenker

INVENTOR  
 LAWRENCE ABRAHAM  
 BY  
 Briesen Knauth  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

LAWRENCE ABRAHAM, OF NEW YORK, N. Y.

## REPEATING MECHANISM FOR TALKING-MACHINES.

1,107,242.

Specification of Letters Patent.

Patented Aug. 11, 1914.

Application filed March 22, 1914. Serial No. 827,936.

*To all whom it may concern:*

Be it known that I, LAWRENCE ABRAHAM, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Repeating Mechanism for Talking-Machines, of which the following is a specification.

10 My invention relates more particularly to a mechanism for use in connection with disk record talking machines although the same may be arranged for use in connection with other types of such machines.

15 My improvement has for its object to adapt the machine to repeat the playing of a record automatically without requiring any attention on the part of the operator other than to keep the motor in operation.

20 Another object of my invention is to prevent the scraping of the reproducing needle over the disk after the record is played if the operator should neglect to remove the said needle from an operative position.

25 Other objects will appear from the description hereinafter and the features of novelty will be pointed out in the appended claims.

30 The herein described mechanism is an improvement on the broad idea included in my application Serial No. 804,622 filed December 4, 1913.

35 Reference is to be had to the accompanying drawings which illustrate an example of my improvement as applied to the well known Victor talking machine and in which—

40 Figure 1 is a plan view; Fig. 2 is a side elevation partly in section; and Figs. 3, 4, 5 and 6 are detail views showing successive steps of operation.

45 In the drawings 10 represents the customary rotatable record table secured upon a suitably driven shaft 11 and having an axial projection 12 extending upwardly from its upper face adapted to project through an axial opening in the customary disk record 13 whereby the latter is positioned on and carried by said table 10 in the well known manner. The sound box 14 carrying the reproducer needle 15 is carried by the tube 16 pivotally secured at 17 upon and communicating with the usual tone arm 18, the latter

being pivoted at 19 upon a stationary portion of the machine. With this construction 55 the sound box and needle together with the tone arm are movable in a horizontal plane and the sound box and needle together with the tube 16 are capable of a movement in a vertical plane about the pivot 17. The parts 60 so far described and their operation are well known for instance in the Victor talking machine and need no further description.

My improved mechanism as illustrated in the present instance comprises a base or support 20 preferably weighted and adapted to be placed upon the table 10 or rather upon a record 13 thereon, an axial recess 21 being provided in said base for the accommodation of the projection 12 and whereby the said 70 support is maintained in a central position on the table or record. The supporting surface of said base 20 is preferably covered with felt or similar material 22 whereby the surface of the record 13 is protected against 75 injury and a better frictional engagement between said record and base is secured for the purpose to be more fully described hereinafter. A rod 23 extends upwardly from the support or base 20 and is adapted to 80 receive an externally screw-threaded split sleeve or collar 24 secured to or forming part of an annular or circular track 25 concentrically arranged about said sleeve or collar 24. A spiral track or cam 26 is located above the 85 track 25 and has its inner end 27 inclined downwardly and connected with said track 25 at 28, the said inner end 27 being preferably circular and arranged concentric with the inner face of the said annular track 25. 90 The outer free end portion 26<sup>a</sup> of the spiral track or cam 26 is preferably made somewhat yielding or flexible for the purpose to be more clearly set forth hereinafter. The tracks 25 and 26 are thus located one above 95 the other in planes parallel to the record table and the record carried thereby and are carried by the sleeve or collar 24 the latter in turn being supported upon the rod 23. In order that the said sleeve or collar 24 100 may be adjustably secured in any position within certain limits upon said rod 23, I provide a lock nut 29 arranged to be actuated to securely clamp said sleeve upon the said rod and to permit a movement length- 105 wise thereof. In this manner the distance



between the tracks 25 and 26 and the face of the record 13 may be varied to permit the said tracks to properly pass over the sound box 14 when my improved mechanism is in operative position.

In order that the said tracks 25 and 26 may properly perform their intended functions I provide a clamp 30 comprising two members pivoted together at 31 and adapted to embrace the tube 16, a nut or screw 32 being provided for securely fastening said clamp 30 in position on said tube 16. A rod 33 is rigidly secured to or forms part of the clamp 30 and as its free end is provided with spaced members 34 connected together and maintained in spaced relation by means of cross-pins 35 and 35<sup>a</sup> as shown in Fig. 2. A pawl 36 has its one end portion bent upon itself to form parallel connected legs 37 and 38 located respectively above and below the pins 35 and 35<sup>a</sup> and between the members 34 as shown in Figs. 3-6. A pin 39 connects the legs 37 and 38 and extends across the space therebetween, said pin 39 being located between the pins 35 and 35<sup>a</sup> and coöperating therewith to limit the movements of said pawl 36 as will be hereinafter more fully described. The free end of the leg 38 is bent as indicated at 40 and the outer free end of the pawl 36 is shaped to form a hook or depending lug 41 adapted to ride up on the preferably beveled outer face 25<sup>a</sup> of the circular track 25 and snap or drop over the upper edge thereof in the operation of the mechanism. Gravity or a suitable spring is adapted to maintain the said pawl 36 in and return it to its normal position shown approximately in Fig. 3. The clamp 30 is preferably secured upon the tube 16 at a point near the pivot 17 with the rod 33 extending in a direction toward the sound box 14 and at substantially right angles to the axis thereof, in which condition the members 34 and pawl 36 are located in more or less close proximity to the said sound box 14 as shown best in Fig. 1.

After the clamp 30 and its connected parts have been properly placed and secured in position and a repetition of a given record is desired, all that is necessary is to place the said record upon the record table 10 in the customary manner and then place the base 20 upon said record with the recess 21 located over the projection 12 as shown in Fig. 2. In this condition the base 20 and with it the tracks 25 and 26 are mounted to rotate in unison with the record table 10 and the disk 13 thereon, the weight of the base 20 and the frictional contact between the felt 22 and the disk 13 and between the latter and the table 10 insuring this result. From this arrangement it will be seen that as the needle 15 follows the

spiral thread of the record and is thus gradually fed inward toward the axis of the record table the pawl 36 will be carried toward the circular track 25, it being understood that the parts are so positioned that this track 25 is in the horizontal path of said pawl 36, while the track 26 rotates in a horizontal plane above the sound box 14 and thus clears the same. As the end of the record is approached the hook or lug 41 will finally engage or strike the beveled face 25<sup>a</sup> of said track 25 and as the needle and connected parts continue to advance toward the axis of the table 10 in the direction indicated by the arrow *a* in Fig. 3 further progress of the said pawl will be arrested so that said pawl remains relatively stationary and the pin 35<sup>a</sup> will be moved toward the pin 39, the members 34 moving along the legs 37 and 38 as will be clear from an inspection of Fig. 3. Throughout this part of the operation the pawl 36 is held against a swinging movement through the coöperation of the legs 37 and 38 with the pins 35 and 35<sup>a</sup> so that any tendency of the hook or lug 41 to ride upon the beveled surface 25<sup>a</sup> is counteracted. The relative sliding movement between the pawl 36 and the members 34 or in other words between the pawl and the needle continues until finally the pin 35<sup>a</sup> contacts with the pin 39 and the bend 40 is in registry with the pin 35 whereupon a continued movement of the needle 15 toward the end or finish of the record will cause said pin 35<sup>a</sup> to exert a push upon the pin 39 and thus force the hook or projection 41 up the beveled face 25<sup>a</sup> of the track 25 until finally the position illustrated in Fig. 4 is reached. The pivotal movement of the pawl 36 at this stage of the operation is made possible owing to the fact that as before stated the bend 40 is in registry with the pin 35 as is clearly shown in said Fig. 4. The pawl 36 now continues to move as a unit with the needle 15 until the hook or lug 41 snaps or drops over the upper edge of the circular track 25 as shown in Fig. 5 and as rotation of the parts continues comes into engagement with the spiral track 26, and is slidably moved thereon across the pins 35 and 35<sup>a</sup> relatively to the members 34 as shown in Fig. 6 until finally the pin 35<sup>a</sup> is again seated in the bend connecting the two legs 37 and 38 and further relative movement between the said pawl 36 and the members 34 is arrested and the said pawl is again locked against pivotal movement relatively to said members 34 and the needle 15.

It will thus be seen that during the initial movement of the pawl 36 along the spiral track or cam 26 the needle 15 remains stationary so that a scraping of the same across the disk beyond the finish point of the record



is absolutely prevented. A continued operation now causes the pawl 36 to exert a pull on the pin 35<sup>a</sup> and as the said pawl 36 rides up the inclined end 27 of the track 26 the rod 33 and clamp 30 are carried along and the tube 16 is rotated about the pivot 17 and the needle 15 in consequence raised or lifted from an operative position to an inoperative position out of engagement with the record.

The pawl 36 on reaching the spiral track 26 will be moved outwardly thereby and will accordingly move said needle 15 outwardly in this inoperative position, back toward the starting point of said record. As this starting is reached the outer free end portion 26<sup>a</sup> will gradually yield downwardly under the weight of the sound box 14 and connected parts and thus bring the needle 15 nearer to the disk, so that as this outer free end portion 26<sup>a</sup> is finally withdrawn from beneath the pawl 36 the said needle 15 will be gently deposited upon said disk at approximately the starting point or beginning of the record. As soon as this happens the end portion 26<sup>a</sup> will return to its normal position and the record will be rendered again without interference until the finish is again reached and the above described operation is repeated, this proceeding continuing until the machine has run down or its operation is otherwise stopped.

It will be seen that my improved mechanism is absolutely reliable in operation and not likely to become disarranged and further that the same may readily be combined with existing machines without necessitating any change in construction. By adjusting the clamp 30 along the tube 16 the position of the pawl 36 relatively to the tracks 25 and 26 may be adjusted and the time of engagement of said pawl with said tracks thus regulated relatively to the record. Similarly by swinging the rod 33 in an arc about the tube 16 as a center the pawl 36 may be raised or lowered to properly engage the track 25 in any adjusted position of the latter. If desired a suitable spring may be introduced for the purpose of maintaining the pawl 36 in its forward position with the pin 35<sup>a</sup> located in the bend connecting the legs 37 and 38.

When it is desired to change the record the base or support 20 is simply removed from the record on the table 10 after which said record may be removed and another one substituted therefor. If this new record is to be repeated the said base is simply replaced; otherwise the machine may be used in the usual way. The clamp 30 and its connected parts may permanently remain on the machine or it may be removed when the base 20 and connected tracks 25 and 26 are not used or when repetition of a record is not desired. The said clamp and its parts do not interfere with the ordinary playing of a record.

My improved device as herein shown and described has in practice given satisfactory results and is efficient in operation but I do not wish to be limited to the specific details of construction illustrated for it will readily be understood that various changes may be made within the scope of the claims without departing from the spirit of my invention.

I claim:

1. In a repeating mechanism for talking machines the combination of a rotatable table adapted to carry a record, a movable reproducing needle, a support adapted to rest upon the record carried by said table, a cam carried by said support and adjustable thereon to vary the distance from the record table and means connected with said needle and adapted to coöperate with said cam whereby said needle is lifted from an operative position and moved back toward its starting point.

2. In a repeating mechanism for talking machines the combination of a rotatable record table, a movable reproducer needle, a cam connected to move with said table and a pawl connected with said needle and movable relatively to said needle in a direction parallel with the path in which said needle travels, said pawl coöperating with said cam to move said needle from an operative position and return it toward its starting position.

3. In a repeating mechanism for talking machines the combination of a rotatable record table, a pivotally mounted reproducer needle, a cam connected to move with said table, a pawl adapted to coöperate with said cam to raise said needle from an operative position and return it toward its starting point, said pawl being slidable relatively to said needle whereby the latter is capable of an independent movement in the direction of its travel and means for causing said pawl and needle to move in unison.

4. In a repeating mechanism for talking machines the combination of a rotatable record table, a pivotally mounted reproducer needle, a cam connected to move with said table, a support connected with said needle, and a pawl on said support adapted to coöperate with said cam to raise said needle from an operative position and return it toward its starting point, said pawl being slidable relatively to said support whereby said needle is capable of an independent movement in the direction of its travel.

5. In a repeating mechanism for talking machines the combination of a rotatable record table, a pivotally mounted reproducer needle, an annular track connected with said table to move therewith, a spiral cam connected with said track, a support detachably connected with said needle, a pawl slidably mounted on said support and



adapted to engage said track and to be slidably moved thereby and guided into operative engagement with said spiral cam, and means for limiting the sliding movement of said pawl.

6. In a repeating mechanism for talking machines the combination of a rotatable record table, a pivotally mounted reproducer needle, an annular track connected with said table to move therewith and having a beveled outer face, a spiral cam connected with said track, a support connected with said needle, a pawl slidably and pivotally connected with said support, a lug on said pawl adapted to engage said beveled face whereby said pawl is slidably moved and travels upon said face to pivotally move said pawl, said track being adapted to guide said pawl into operative engagement with said spiral cam and means for limiting the sliding movement of said pawl and for preventing pivotal movement thereof during such sliding movement.

7. In a repeating mechanism for talking machines, a rotatable record table, a tone arm movable in a direction across said table, a tube pivotally connected therewith to swing in a plane at right angles to said direction, a sound box carried by said tube, a reproducer needle connected with said sound box, a clamp arranged to be secured upon said tube, a rod carried by said clamp, a pawl slidably mounted on said rod, a spiral cam, and an annular track connected to move with said table and connected with said cam, whereby said pawl is slidably moved and guided into operative connection with said

cam and said tube is pivotally moved and said needle is raised from an operative position and returned toward its starting position.

8. In a repeating mechanism for talking machines, a rotatable record table, a tone arm movable in a direction across said table, a tube pivotally connected therewith to swing in a plane at right angles to said direction, a sound box carried by said tube, a reproducer needle connected with said sound box, a clamp arranged to be secured upon said tube, a rod carried by said clamp, spaced members located at the free end of said rod, pins connecting said members, parallel connected legs slidable above and below said pins and between said members, a cross-pin connecting said legs at a point between said first named pins, a lug connected with said legs, a base adapted to rest upon a record carried by said table, an annular track on said base and a spiral cam connected with said track, said track being arranged to engage said lug and slidably move said legs between said members and to guide said lug into operative engagement with said cam whereby said tube is pivotally moved and said needle is raised from an operative position and returned toward its starting position.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LAWRENCE ABRAHAM.

Witnesses:

PAUL W. FRESE,  
ARTHUR G. JARVIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

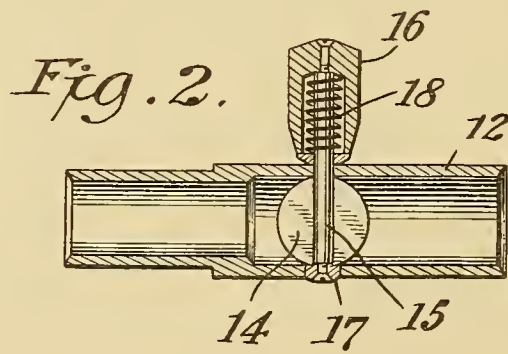
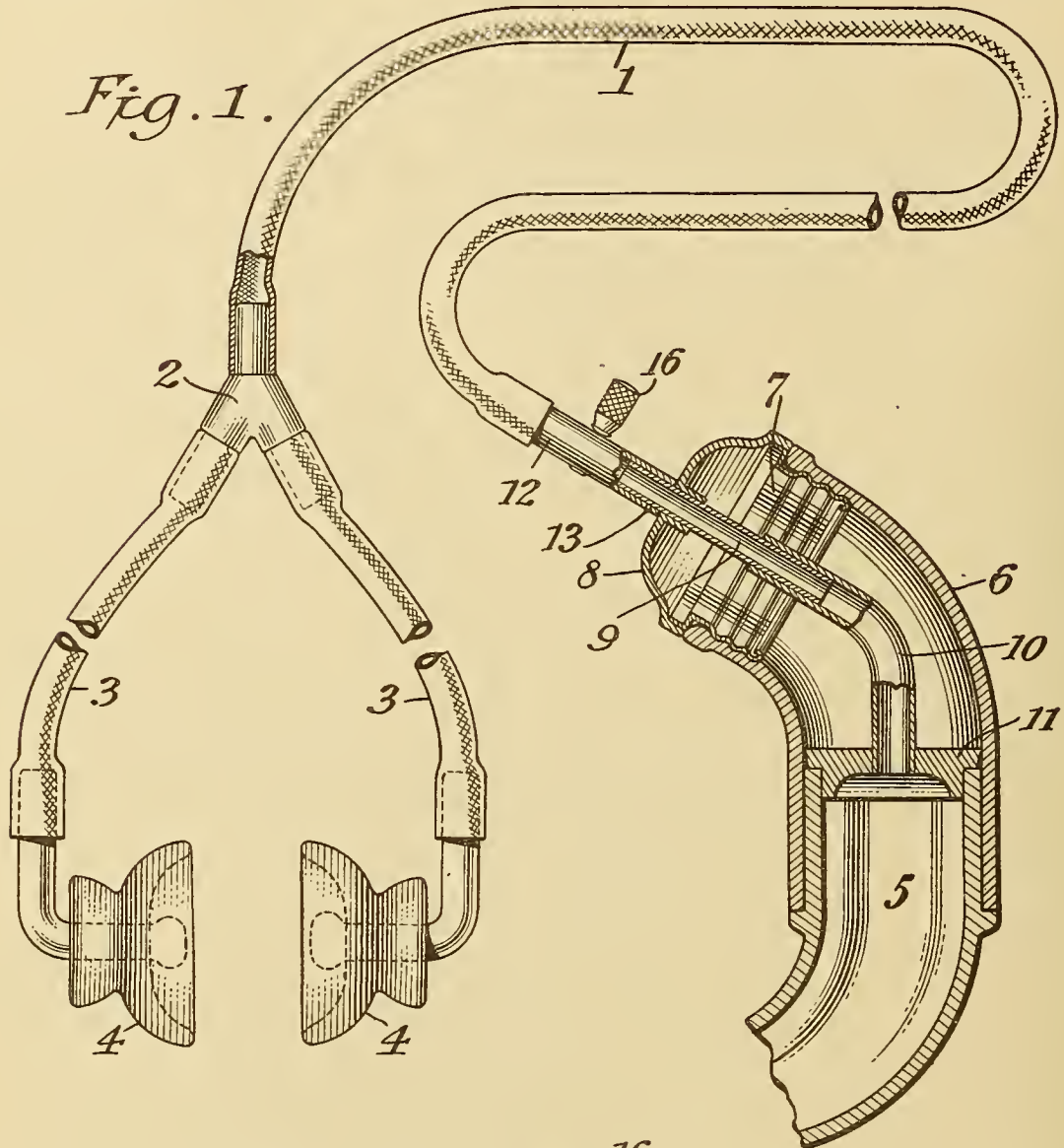




H. A. YERKES.  
 COUPLING FOR LISTENING TUBES.  
 APPLICATION FILED OCT. 3, 1913.

1,107,471.

Patented Aug. 18, 1914.



Witnesses:  
 Jas. H. Anderson.  
 E. E. Warfield

Inventor  
 Hubert A. Yerkes.  
 By his Attorneys  
 Mauro, Cameron, Lewis & Massie

# UNITED STATES PATENT OFFICE.

HULBERT A. YERKES, OF HACKENSACK, NEW JERSEY, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## COUPLING FOR LISTENING-TUBES.

1,107,471.

Specification of Letters Patent. Patented Aug. 18, 1914.

Application filed October 3, 1913. Serial No. 793,205.

*To all whom it may concern:*

Be it known that I, HULBERT A. YERKES, a citizen of the United States, and a resident of Hackensack, New Jersey, (whose post-office address is Hackensack, New Jersey,) have invented a new and useful Improvement in Couplings for Listening-Tubes, which invention is fully set forth in the following specification.

The invention is intended primarily for graphophones or other talking-machines employed for language-lessons, especially machines of the construction employed for reproducing disk records and known as "disk machines".

At the present day, the greater number of talking machines, and practically all disk machines, employ a large, flaring horn, either external and visible or concealed within a cabinet. But when talking-machines are used for the study of languages, where the student desires to have the same passages repeated again and again, it is in many cases preferable to employ listening-tubes instead of horns, so that the sounds will be more clearly and accurately conveyed to the ears of the student, and will be audible only to the student and not to others.

Listening-tubes are commonly used in transcribing from dictation-machines. But these machines are constructed to utilize cylindrical records; and the construction of the disk-machines is such as to prevent the attachment thereto of the ordinary listening-tubes, and there are certain acoustical as well as mechanical difficulties in adapting the ordinary listening-tubes to said disk-machines.

The present invention, then, consists broadly of a novel coupling for connecting the listening-tube to the sound-conduit of a talking-machine.

The invention consists further in the various features hereinafter set forth and claimed.

The invention will be best understood by reference to the annexed drawings that illustrate a preferred embodiment thereof.

In these drawings, Figure 1 is a side view, partly in section, showing one form of listening-tube connected to the sound passage of an ordinary disk talking-machine, by means of a preferred embodiment of the new coupling. Fig. 2 is a longitudinal section through a portion of the tube, showing details.

In the drawings, 1 represents the main portion of the listening-tube proper, a piece of flexible tubing, such as the soft-rubber tubing ordinarily employed for the purpose, having the rigid Y-piece 2 inserted in one end thereof to receive the branch-tubes 3—3 of similar construction, which latter lead to the two ear-cups 4. If desired, however, there may be but one ear-cup only; and the construction of that member may be varied considerably.

5 represents the "throat" of the sound-conduit of the talking-machine, which conduit terminates in a screw-threaded socket 6 (that may be swiveled thereon), in which is usually secured the smaller end of the ordinary horn (not shown). In utilizing the present invention, the horn is removed from its socket 6, and the new coupling secured therein.

Preferably the coupling comprises a two-part cap or cover, whereof 7 is a ring, which may be a metal casting or struck up from sheet-metal, having the external screw-threads to engage the threads in the socket 6; and 8 is a member, preferably dome-shaped as shown, secured over the outer end of ring 7, and with it constitutes the cap or cover.

9 is a tube passing centrally through the member 8 and rigidly secured thereto.

10 is a tubular elbow-member, one end of which telescopes over the inner end of the tube 8, while the other end extends downward into throat 5 and carries an obturator in the form of the rubber cup 11 which encircles the tube snugly and fits snugly within said throat. An additional tubular member 12 fits over the outer end of the tube 9, and may be secured thereto as by a small pin or set-screw 13. The end of the flexible-tubing 1 is passed over the reduced outer end of this last named tube 12. Preferably there will be a sound-modifier, comprising a disk 14 fitted within the bore of tube 12 and secured to a shaft 15 journaled transversely thereof. At the extended outer end of this shaft is secured a hollow cap 16 that serves as a handle; while the other end of the shaft is screw-threaded to receive the lock-nut 17. A coil spring 18 within the hollow handle surrounds the shaft, and forces the disk against the wall of its tube with sufficient pressure to hold it in any desired position of axial adjustment.

To connect the coupling to the talking-



machine, the flaring horn is removed from socket 6, and the cup 11 and elbow 10 are inserted into the throat 5, and the cap 7—8 engaged with the socket 6 and then screwed  
5 down. The free engagement of the tube 9 upon the elbow member 10 permits this to be done without moving the rubber cup. If desired, the flexible tube 1 can be removed beforehand, and then restored to place after  
10 the coupling has been screwed home. To remove the parts, the flexible tubing 1 can first be pulled off the end of the tube 9; and the cap 7—8 unscrewed, and then the parts drawn out from the socket.

15 It will be observed that the throat and socket 5—6 of the sound-conduit are of substantial diameter, very much larger than that of the listening-tube itself; and it has been found that if the listening-tube should  
20 terminate at or a little beyond the cap, then there will be formed (within the throat) a sort of resonance-chamber which interferes with the clearness and the accurate definition of the sounds. But this objection seems to  
25 be entirely removed by the presence of the obturator 14.

In the reproduction of different sound-records containing language-lessons, considerable differences in loudness are naturally  
30 to be expected; and it has been found very desirable to employ a sound-modifier such as damper 14. By means of this damper the listener can more or less muffle the louder sounds, yet can be able to receive the full  
35 volume of the fainter sounds. However, if desired, a sound-modifier can be dispensed with and the other parts employed alone.

The invention has thus been described with considerable detail, but only for the  
40 sake of clearness; since it is not limited to the precise construction and arrangement of parts shown and described. Various modifications of the mechanical construction of the cap 7—8 might be resorted to; the shape and  
45 curvature of the elbow-member might be varied considerably, according to the shape and direction of the socket and throat of the sound-conduit; and the shape of the cup 11, as well as its position within the throat,  
50 might also be varied to suit the requirements of the particular talking-machine.

Having thus described my invention, what I claim is:

55 1. A coupling for listening-tubes for talking-machines, comprising a screw-threaded cap adapted to be screwed into or out of the socket in the sound-conveyer of the talking-machine, a tubular member rigidly secured to said cap and passing therethrough to  
60 communicate at its outer end with the listening tube, a tubular elbow-member telescoping freely with the inner end of the last-named member, and a rubber cup fitted

snugly upon the other end of said elbow-member and adapted to fit snugly within the  
65 throat of the sound-conduit.

2. A coupling for listening-tubes for talking-machines, comprising an obturator adapted to fit snugly within the throat of  
70 the sound-conduit of the talking-machine, a cap adapted to be detachably secured over the outlet of said sound-conduit, and a tubular passage connecting said obturator and cap and providing a reduced passage there-  
75 through for communicating with the listening-tube.

3. The combination of a talking-machine having the usual tone-arm swinging from a stationary support and with a comparatively  
80 large throat at the pivoted end thereof, an obturator fitted snugly yet removably within said throat, and a reduced passageway extending through said obturator and adapted to receive a listening-tube of smaller diam-  
85 eter than the throat of said tone-arm.

4. The combination of a talking-machine having the usual tone-arm swinging from a stationary support and with a comparatively  
90 large throat at the pivoted end thereof, an obturator fitted snugly yet removably within said throat, a reduced passageway extending through said obturator, and means carried at the outer end of said sound-conduit for centering said passageway.

5. A coupling for listening-tubes for talk-  
95 ing-machines, comprising an obturator adapted to fit snugly within the throat of the sound-conduit of said machine, a tubular member carried by and passing through said obturator, a cap adapted to be secured de-  
100 tachably over the outlet of said conduit, a tubular member secured to and passing through said cap and telescoping freely with the first-named tubular member, a third tu-  
105 bular member carrying a sound-modifier and secured to the second-named tubular member, and a flexible listening-tube secured to the last-named member.

6. A coupling for listening-tubes for talk-  
110 ing-machines, comprising a detachable cap adapted to cover the stationary outlet of the sound-conduit, a tubular member passing through said cap and adapted to receive the listening-tube, a second tubular member  
115 fitted freely on the other end of the first-named member and carrying an obturator fitted snugly within the throat of the sound-conduit.

In testimony whereof I have signed this specification in the presence of two subscrib-  
120 ing witnesses.

HULBERT A. YERKES.

Witnesses:

LILLIAN E. MOORE,  
RALPH L. SCOTT.



V. H. EMERSON.  
SOUND RECORD.  
APPLICATION FILED MAY 18, 1911.

1,107,502.

Patented Aug. 18, 1914.

2 SHEETS—SHEET 1.

Fig. 1

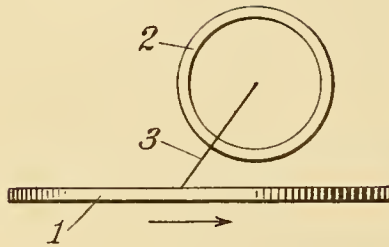


Fig. 2

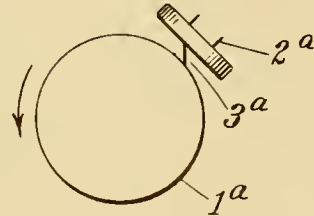


Fig. 3

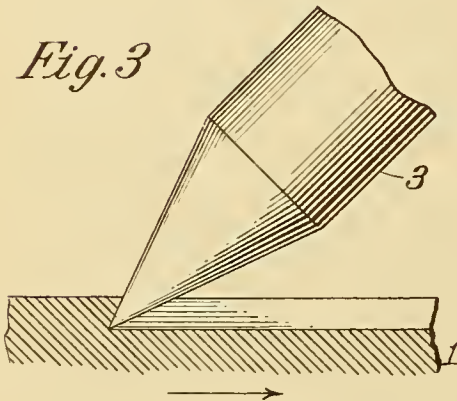


Fig. 4

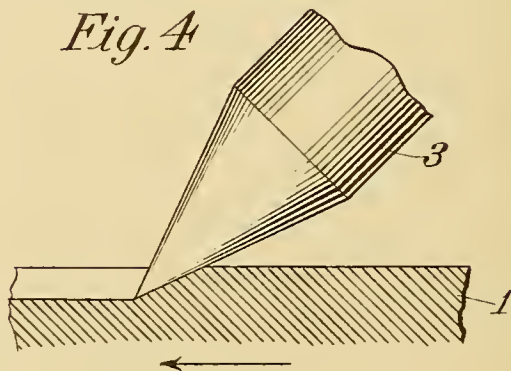


Fig. 5

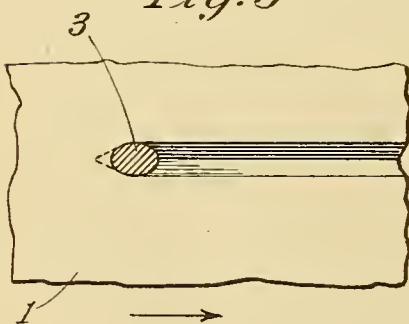


Fig. 6

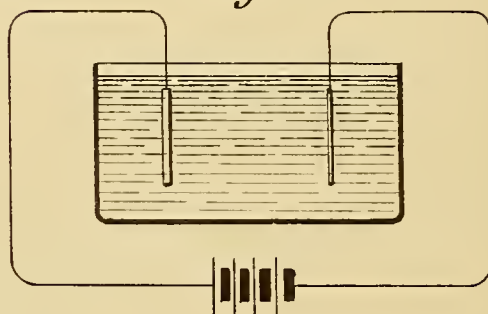
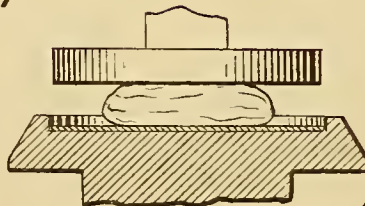


Fig. 7



Witnesses:  
Raphael Ketter  
Ruth C. Fitzhugh

Inventor  
Victor H. Emerson.  
By his Attorneys  
Mauro, Camerow, Lewis & Massie.





V. H. EMERSON.  
SOUND RECORD.  
APPLICATION FILED MAY 18, 1911.

1,107,502.

Patented Aug. 18, 1914.

2 SHEETS-SHEET 2.

Fig. 8

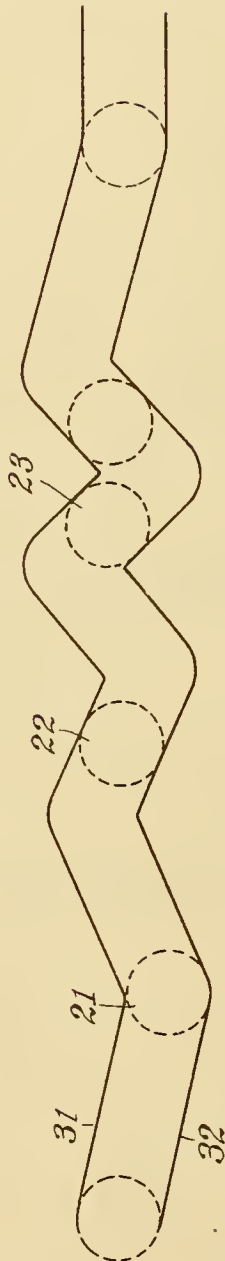
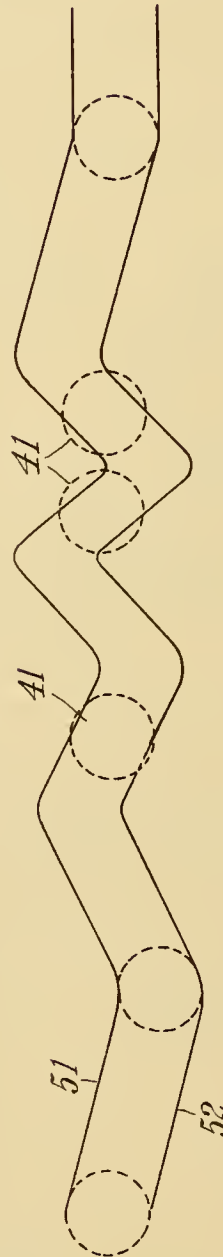


Fig. 9



Witnesses:  
*Rapphaël Petter*  
*Ruth C. Fitzhugh*

Inventor  
*Victor H. Emerson*  
By his Attorneys  
*Mauro, Cameron, Lewis & Massie*

# UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-RECORD.

1,107,502.

Specification of Letters Patent.

Patented Aug. 18, 1914.

Application filed May 18, 1911. Serial No. 628,029.

*To all whom it may concern:*

Be it known that I, VICTOR H. EMERSON, a citizen of the United States of America, and a resident of New York city, New York, have invented a new and useful Improvement in Sound-Records, which invention is fully set forth in the following specification.

This invention relates to sound-records for talking-machines and the production thereof. It is particularly adapted for records in the form of a flat tablet or disk having the record-groove of practically-uniform depth arranged thereon in spiral form and characterized by lateral irregularities corresponding to sound-waves (commonly known as "zigzag disk records"); but the invention is likewise applicable to disk records having the spirally-arranged record-groove of varying depth (commonly known as the "up-and-down records"); and the invention is also applicable to record-grooves of either type upon tablets of cylindrical or other form.

This invention is based upon my novel manner or process of producing the "original sound-record," and the use of my novel "recording-stylus," which, however, are not here claimed.

The invention here claimed consists of my novel sound-records themselves (both "original records" and also commercial records obtained therefrom).

My invention consists further in the various details and features hereinafter set forth and claimed.

The invention will be best understood by reference to the annexed drawings which illustrate various portions thereof.

In these drawings,—Figures 1 and 2 are elevations, indicating conventionally the production of original sound-records by my invention. Fig. 3 is a side-view on an enlarged scale, showing my recording-stylus in the preferred method of using it. Fig. 4 is a modification of the same. Fig. 5 is a horizontal section through the stylus at the surface of the tablet in Fig. 3. Fig. 6 represents conventionally an electroplating bath, and Fig. 7 a press, as practical means for obtaining copies of the original. Fig. 8 is a plan, upon a greatly-exaggerated scale, illustrating conventionally a portion of my new

record groove; and Fig. 9 is a similar conventional plan of the record-groove of the prior art.

As my invention is intended primarily for zigzag disk records (though applicable to other forms and types) I will describe it in that connection.

Referring to Figs. 1, 3 and 5,—1 represents the flat record-tablet, which broadly speaking is of the wax-like composition commonly used in this art. 2 represents a sound-box, upon which the new stylus 3 is mounted in the ordinary manner. The tablet 1 is carried upon the usual turntable and revolves in the direction indicated by the arrow.

My new stylus has the operating portion or tip in the form of a cone, being rounded off uniformly on all sides, as indicated in Fig. 3. It is not essential that this recording-tip should be a precise mathematical cone. It is sufficient that in cross section it should be practically symmetrical, and without any cutting-edges, as indicated in Fig. 5, where it is practically elliptical, being a section through a cone by a plane at an angle to the axis of the cone. Figs. 1 and 3 indicate the preferred manner of using this stylus in making the record. The stylus is shown at an angle of about 45° (more or less) to the surface of the tablet. The effect of revolving the turntable and tablet 1 in the direction shown in Fig. 1 is the same as if the stylus 3 were shoved point foremost. In its passage through the material of the tablet, the stylus cleaves or plows its way, removing the material from the tablet in the form of a fine thread or shaving, or under favorable conditions as separate particles in powdery form (according to the consistency of the material). Apparently the extreme tip or acute point of the stylus 3 first cleaves its way, crushing the material out as a plow, while the successive wider portions of the stylus (above the extreme tip) serve to simultaneously crush and smooth or polish the side-walls of the record-groove. As the result of this operation, I have recorded selections which, when copied in more durable form and audibly reproduced, manifest remarkably superior quality. This method of producing the original record, wherein the



material is removed entirely from the tablet to produce the record-groove is distinguished from the "cutting-out" of U. S. Letters-Patent No. 896,059, granted Aug. 11, 1908; and my new process is distinguished on the other hand from the "displacing" operation described in U. S. Letters-Patent No. 941,010, granted Nov. 23, 1909, according to which latter patent the material is not removed from the tablet but merely shoved to either side of the "record-groove."

Instead of shoving the stylus 3 through the surface of the tablet as indicated in Figs. 1 and 3, it may be dragged through the tablet as indicated in Fig. 4; and instead of employing a flat tablet or disk 1, as indicated in Fig. 1, I may employ a cylindrical tablet 1<sup>a</sup>, as indicated in Fig. 2; and instead of having the sound-box with its stylus arranged to vibrate laterally (in the plane of the surface of the tablet) as in Fig. 1, the parts may be arranged as in Fig. 2 so that the stylus 3<sup>a</sup> will vibrate to and fro to produce the up-and-down type of record-groove. In employing my invention, the up-and-down type of record-groove may be applied to a disk tablet, or the zigzag type to a cylindrical tablet. This method of producing original records may be practised with any usual record-composition; but, better results can be obtained if the composition be especially adapted for the purpose. Among other compositions, I have employed with success a mixture of about two parts beeswax and two parts stearic acid with one part of carnauba wax; although these proportions may be varied greatly and different ingredients employed. In using that particular formula I have found that the same is liable to solidify with more or less crystallization, which is objectionable; and I have found that this objection may be overcome by pouring the melted mixture just referred to over a flat metal plate, to obtain a comparatively thin layer, which is suitable for the purpose. Of course, immediately before using a record-tablet for recording, the surface thereof is turned true by a shaving-knife in the usual manner practised in the production of disk sound-records.

The characteristics, which a suitable record-material should present, are that the material must be crisp, or crumbly, or "crushable," or chalky, or "short," or friable,—as distinguished from a yielding, spongy, tenacious, cohesive, sticky, and "pully," material. The function or operation of my new recording-stylus appears to be to crush or break-up the material, which operation is best carried on upon a material of the character above described as "friable,"—whereas in a material of the yielding and tenacious character, the particles re-

moved to produce the record-groove would adhere or cling to the tablet and thereby deface the sound-record; moreover, the material itself, by which I mean the body of the tablet, would tend to "spring back" and to that extent mar or deface or obliterate the impressions already produced by the stylus.

Having obtained an original sound-record as above indicated, by means of the stylus above described (when employed in the manner set forth), and in a material of the character described—such original sound-records can be employed for direct, audible reproduction. But preferably duplicates or copies will be made therefrom in any desired manner. For obtaining duplicates of the disk type, I would employ the electroplating process indicated in Fig. 6, followed by pressing the electroplates thereby obtained into suitable thermo-plastic material, as indicated in Fig. 7. This process is fully set forth in U. S. Letters-Patent No. 688,739, granted Dec. 10, 1901.

Various processes of duplicating have been employed for copying cylindrical records; and the particular method employed for the purpose with either form of record is not material so long as duplicates or copies of my original record-groove are obtained.

With regard to the record-tablet and its quality, I have found that it is sometimes desirable to give the surface of the record-tablet a preliminary coating of graphite, finely-powdered graphite being carefully brushed over the surface to coat the same thoroughly. This serves as a lubricant, and permits the stylus to vibrate with less opposition so as to produce a record-groove that gives a more true indication of the original sound-waves. When this graphiting is employed, the recording-stylus seems to carry more or less of the graphite down with it, the graphite being found as a thin, faint coating upon the bottom and side-walls of the record-groove. However, when the material is otherwise of the proper consistency, I prefer not to use the graphiting step above referred to—in fact I find it not so desirable.

Referring now to the greatly exaggerated conventional views of Figs. 8 and 9: 21, 22, 23, etc. indicate different positions occupied by my recording-stylus in producing the record-groove whose side-walls are indicated by 31 and 32. It is obvious that if the groove be measured by a line extending at right angles from any particular portion of the side-wall of the record-groove, the distance across or the effective width of the groove is constant,—being the diameter of the recording-stylus. On the other hand, referring to Fig. 9, the successive positions of the flattened recording-stylus heretofore



employed, are indicated by 41, 41, etc.; and the side-walls of the record-groove produced thereby are indicated by 51 and 52. It is obvious that measured transversely by the  
 5 parallel lines corresponding to the width of this old recording-stylus, this record-groove is of constant width; but measured by a line at right angles from any particular portion of the side-wall of the old rec-  
 10 ord-groove, the same will be found to be of varying width,—being wider where the recording-stylus 41 was advancing straight ahead, and being narrower where the recording-stylus 41 was advancing in an oblique  
 15 direction. Consequently the record-grooves of the records heretofore known are not of constant effective width. This is one distinctive feature of my sound-record; namely, that it has a record-groove “of constant effective width.” This is valuable in repro-  
 20 ducing. With the prior records it is obvious that the reproducing-stylus must be no larger than the narrowest portion of the record-groove,—which means that the reproducing-stylus must be of smaller dimen-  
 25 sions than the recording-stylus; and this means that the reproducing-stylus does not fit truly in the groove, and is liable to more or less rattle in reproducing. Or if a re-  
 30 producing-stylus be employed of substantially the same dimensions as the recording-stylus, then in reproducing it has to tear its way through the narrower portions of the record-groove, which not only injures the  
 35 walls or record-surface of those portions of the groove, but likewise wears or grinds the extreme tip of the needle. In my new record-groove, on the contrary, a reproducing-stylus of precisely the same size and shape  
 40 as the recording-stylus may be employed, and it will follow freely and intimately throughout the entire length of the record-groove with less wear upon the needle itself and upon the walls of the groove, thereby  
 45 prolonging the life of both.

It might be imagined that the keen cutting-edges indicated in the recording-stylus heretofore employed are more efficient in that they can produce the more minute indentations corresponding to the overtones, but this is not of any importance. Assuming for the moment that it is true, yet the reproducing-stylus, if it cannot enter the more minute indentations, would not be able  
 55 to reproduce from them. But, as a matter of fact, my rounded and non-cutting recording-stylus produces just the same number of alternating concavities and convexities in the side-walls of the groove, and of just the  
 60 same frequency, and of the same relative depths and shallownesses, as in case of the keen-edged cutting-out tool. And the audible reproductions are even more faithful, because the reproducing-stylus (being of the  
 65 same shape and size as the recorders) can

enter wherever the recorder went; and, further, the side-walls of my new groove seem smoother than the “cut” walls of the prior art.

I have thus described my invention and  
 70 an embodiment thereof, with considerable detail, but merely for the sake of clearness, since my invention is not limited to the precise details thus set forth. The spirit of my invention involves each of the following  
 75 broad features:—the employment for recording purposes of a stylus which is practically symmetrical in cross-section and without any cutting-edges and without being flattened longitudinally of the record-  
 80 groove; the employment of such stylus in crushing out and removing the material from the tablet which forms the record-groove as distinguished from “cutting out” of the material and as distinguished from  
 85 merely displacing the material without removing it from the tablet; and the employment of said stylus in such a method with a material which I may designate as “friable.” And, in case of zigzag records, the produc-  
 90 tion of a record-groove which shall have a constant effective width.

My invention consists further in producing commercial duplicates or copies, in hard and more durable material, of such record-  
 95 groove of constant effective width; and in a commercial sound-record having that characteristic. Finally, the extreme tip of my new stylus produces a sharply-defined track in the extreme bottom of the grooves, which  
 100 the tip of the reproducer follows with utmost fidelity; that is to say, the opposite walls of my new record-groove converge to a narrow line, so that the groove in cross-section may be defined as V-shaped.  
 105

Having thus described my invention, I claim

1. A sound-record of the zigzag type consisting of a tablet of friable material having a record-groove formed therein by crushing  
 110 out and removing the material to produce a groove of constant effective width.

2. A sound-record consisting of a tablet of friable material having a record-groove of substantially uniform depth and of constant effective width and formed by crushing  
 115 out and removing the material from said tablet.

3. A sound-record consisting of a tablet of friable material having a record-groove  
 120 of substantially uniform depth and of constant effective width, the undulations of which are formed directly in accordance with the vibrations from a source of sound.

4. A sound-record consisting of a tablet  
 125 of friable material having a record-groove formed therein by crushing out and removing the material.

5. A sound-record consisting of a tablet having a substantially V-shaped record-  
 130

groove of uniform depth and constant effective width, the undulations of which are formed directly in accordance with the vibrations from a source of sound, said record-groove being characterized by having its bottom consisting of a sharply defined zigzag line corresponding to sound-waves.

6. A sound-record consisting of a tablet having a substantially V-shaped record-groove of uniform depth and constant effective width, the undulations of which are formed directly in accordance with the vibrations from a source of sound.

7. A sound-record consisting of a tablet having a record-groove of constant effective width produced by crushing out and removing the material to produce lateral undulations by and in accordance with sound-waves.

8. A sound-record consisting of a tablet having a record-groove of constant effective width formed from a similar record-groove produced by crushing out and removing the material to produce lateral undulations by and in accordance with sound-waves.

9. A sound-record consisting of a tablet having a record-groove formed therein by crumbling the material and removing it

from the tablet by and in accordance with sound-waves.

10. A sound-record consisting of a tablet having a record-groove formed from an original record-groove produced by crumbling out the material of a suitable record-tablet and removing it therefrom by and in accordance with sound-waves.

11. A sound-record consisting of a tablet having a record-groove of substantially uniform depth and of constant effective width, the undulations of which are formed directly in accordance with the vibrations from a source of sound.

12. A sound-record consisting of a tablet having a zigzag record-groove of substantially uniform depth and of constant effective width, the undulations of which are formed directly in accordance with the vibrations from a source of sound.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

C. A. L. MASSIE,  
RALPH L. SCOTT.





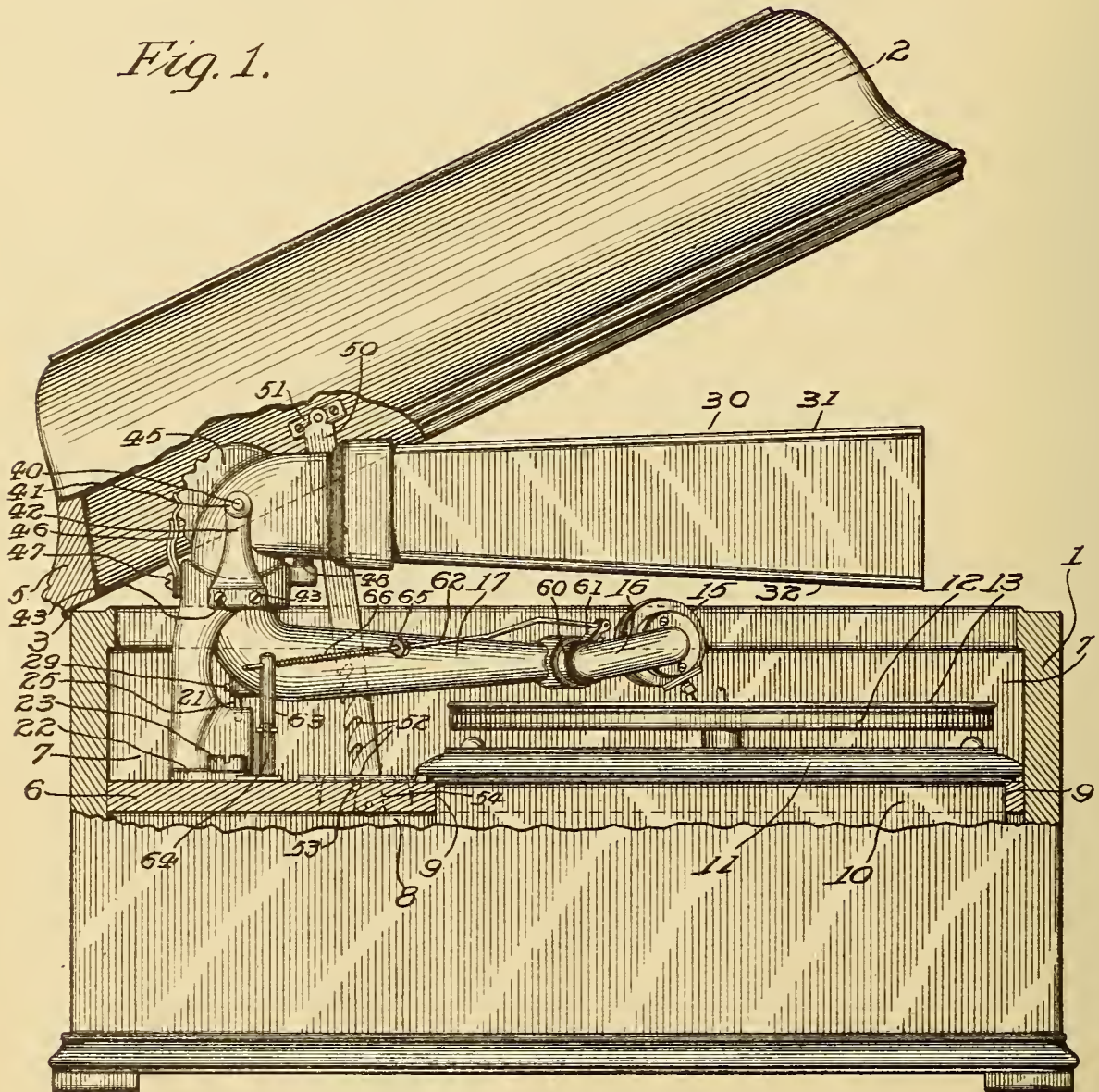
J. C. ENGLISH.  
TALKING MACHINE.  
APPLICATION FILED JULY 10, 1909.

1,107,597.

Patented Aug. 18, 1914

3 SHEETS—SHEET 1.

*Fig. 1.*



INVENTOR

*John C. English.*

WITNESSES

*F. J. Hartman.*

*A. J. Gardner.*

BY

*Wm. Pitt.*

ATTORNEY



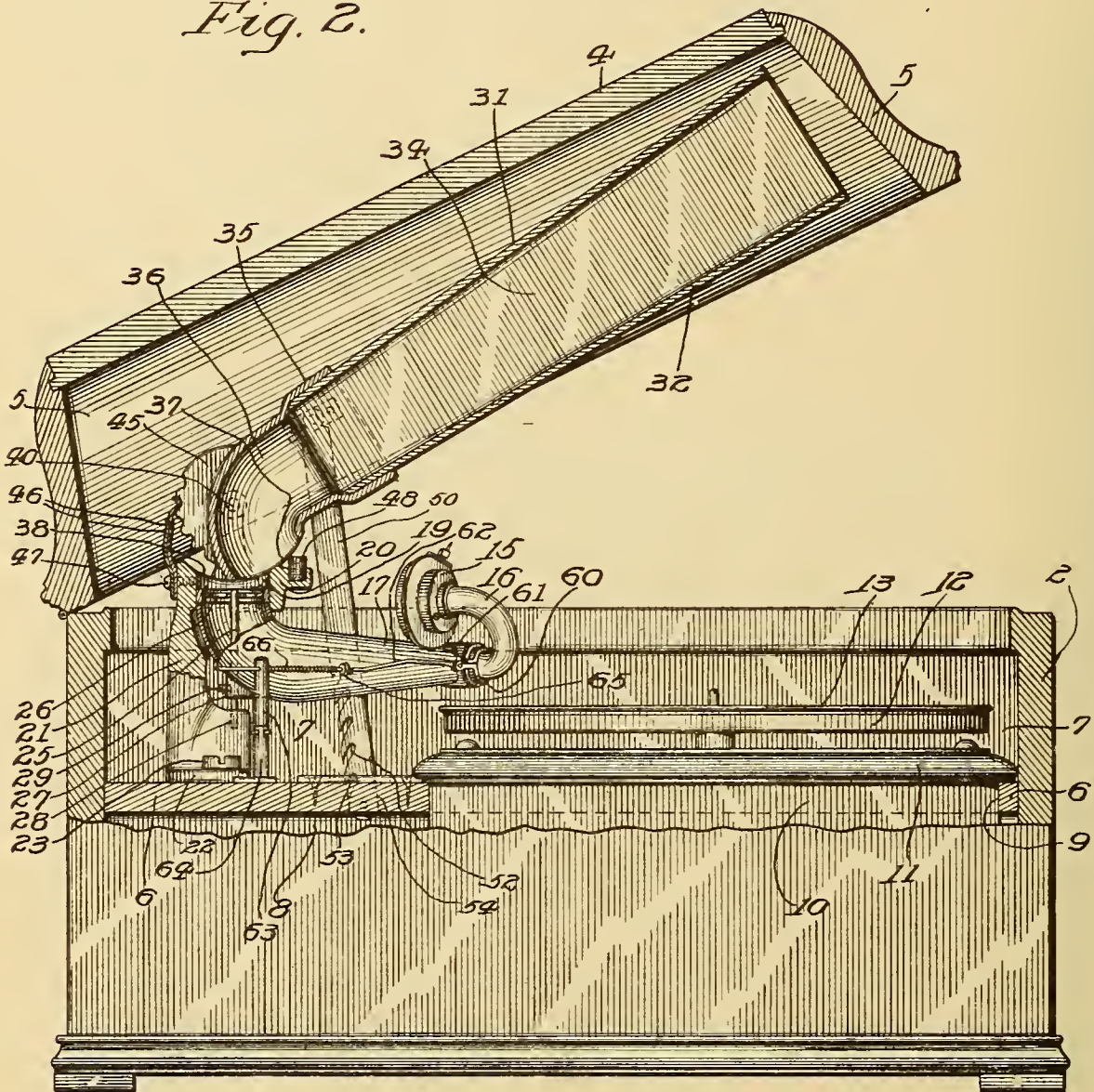


J. C. ENGLISH.  
TALKING MACHINE.  
APPLICATION FILED JULY 10, 1909.

1,107,597.

Patented Aug. 18, 1914.  
3 SHEETS—SHEET 2.

Fig. 2.



INVENTOR

John C. English.

WITNESSES

F. J. Hartman.

A. J. Gardner.

BY

Harve Pettit.

ATTORNEY



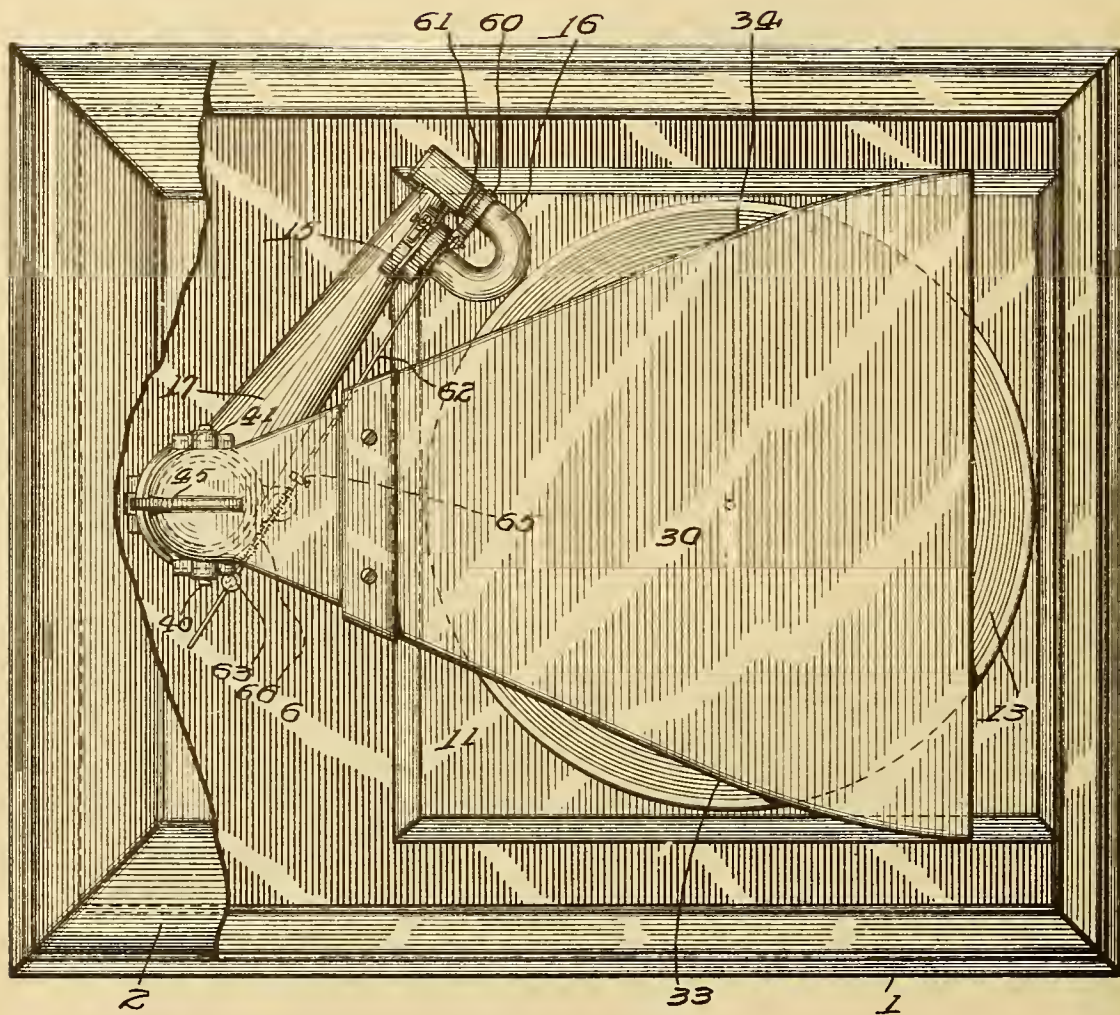
J C. ENGLISH.  
TALKING MACHINE.  
APPLICATION FILED JULY 10, 1909.

1,107,597.

Patented Aug. 18, 1914.

3 SHEETS—SHEET 3.

*Fig. 3.*



WITNESSES  
*H. G. Hartman.*  
*A. J. Gardner.*

BY

INVENTOR  
*John C. English.*  
*Wm. Pitt.*  
ATTORNEY



# UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,107,597.

Specification of Letters Patent.

Patented Aug. 18, 1914.

Application filed July 10, 1909. Serial No. 503,865.

*To all whom it may concern:*

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The main objects of this invention are, to provide an improved compact inclosed talking machine; to provide an improved talking machine having a record support and a jointed amplifier in which the major portion or delivery end of the amplifier is adjustable toward and away from the record support; to provide an improved talking machine having a record support, actuating mechanism, and a jointed amplifier above the record support, all inclosed in a cabinet; to provide a talking machine having a record support, actuating mechanism, and an amplifier, all inclosed in a cabinet comprising a body portion and an adjustable cover, and in which the delivery end of the amplifier may be adjusted outside of the body of the cabinet between the body and the cover, and independently of the cover; to provide means for automatically returning a sound box arm to an inoperative position at one side of the record support; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary side elevation partly in vertical section, of a talking machine constructed in accordance with this invention; Fig. 2 a similar side elevation partly in vertical section showing the parts of the same in inoperative position; Fig. 3 a fragmentary top plan view of the same showing the cabinet closed and the parts of the machine in inoperative position.

Referring to the drawings, one embodiment of this invention comprises a casing or cabinet having a body portion 1 open at its upper end and provided with a cover 2 hinged thereto upon a horizontal axis as at 3, forming a closure for the upper end of the body portion. This cover comprises a top wall 4 having a downwardly flaring rim 5 forming the sides of the cover.

The body of the cabinet is divided by a

horizontal partition 6, into an upper compartment 7 and a lower compartment 8, and this partition is provided with a rectangular aperture 9 in which rests a motor casing 10 containing the actuating mechanism (not shown) of the machine.

Mounted upon the top 11 of the motor casing 10, and within the upper compartment 6 of the cabinet is a rotary disk record support 12 adapted to hold the usual disk sound record 13. Arranged above the record support in position to cooperate therewith is the usual sound box 15 mounted upon the usual U-shaped tube 16 pivotally supported by the free end of a forwardly tapering tubular sound box arm 17. The sound box arm is arranged in a substantially horizontal plane and the larger end of the arm is curved upwardly through an arc of about 90 degrees and fits rotatably within a cylindrical aperture 19 of an annular lateral extension 20 of a vertical bracket 21. The lower end of the bracket 21 is provided with laterally extending flanges 22 and is secured rigidly to the horizontal partition 6 of the cabinet by means of screws or other suitable fastening devices 23 which pass through the flanges 22 and into the partition.

For rotatably holding the sound box arm 17 in position, a vertical pivot 25 is secured at its upper end centrally in a spider 26, which fits snugly within the cylindrical opening 19 of the bracket, and the lower end of the pivot passes through a lug or sleeve 27 projecting downwardly from the arm, and engages in a suitable socket 28 in the bracket beneath the arm, the arm being held rigid with the pivot by means of a set screw 29 and the ends of the pivot being rotatably mounted in the spider and bracket respectively. The sound box arm is thus mounted to swing in a horizontal plane about a fixed vertical axis.

The tapering tubular sound box arm 17 may be considered as forming the neck or smaller portion of a jointed sectional substantially U-shaped sound amplifier, the body or major portion 30 of which is movable with respect to the neck. The body of the amplifier is preferably so proportioned and located as to be at all times out of contact with any part of the cabinet and above the plane of the upper edges of the body of



the cabinet, and to be surrounded by the downwardly flaring rim of the cover 2, when the cover is closed. This body is preferably substantially rectangular and oblong in transverse section and comparatively flat, comprising two substantially flat sounding boards 31 and 32 forming the top and bottom respectively of the body of the amplifier, and two substantially flat vertically arranged boards 33 and 34 forming the sides of the body. The top and bottom boards diverge slightly forwardly toward the front of the cabinet and the sides of the amplifier also diverge forwardly but to a greater degree than the top and bottom.

The inner ends of the four boards of the body of the amplifier, are snugly fitted in a transversely rectangular rigid socket 35 formed by the outer end of a hollow rigid longitudinally tapering elbow 36. The rear or smaller portion of the elbow 36 curves downwardly, preferably through about 90 degrees, terminating in a cylindrical convex transverse end wall 37, adapted to engage against the coaxial cylindrically concave transverse end wall 38 of the upper portion of the fixed bracket 21, supporting the sound box arm.

The elbow 36 is pivoted upon horizontal trunnions 40 rigid with the elbow and extending in opposite directions therefrom respectively, which are rotatably mounted in suitable apertures or bearings 41 in the upper ends of upwardly extending arms 42. The lower ends of the arms 42 are rigidly secured by screws 43, or other suitable means, to the opposite sides respectively of the annular extension 20 of the fixed bracket 21, the axis of the trunnions being coincident with the axis of curvature of the cylindrical end of the elbow and the corresponding cylindrical end of the bracket. The body 30 of the amplifier is thus mounted to swing about the fixed axis of the trunnions 40, and in a plane transverse and substantially perpendicular to the plane of the record support, the convex end of the elbow sliding over the concave surface of the bracket, and the interior of the amplifier being kept in communication with the interior of the sound box arm.

For holding the body 30 of the amplifier in any desired position of movement about its longitudinal axis, the elbow 36 is provided with a segment 45 provided with a series of spaced teeth arranged in an arc concentric with the axis of movement of the body and adapted to be engaged by the upper curved free end of a base spring catch 46, the lower end of which is rigidly connected to the fixed bracket 21 by a screw 47 or other suitable means. The upper end of the spring catch is curved to fit in the recesses between the teeth of the segment and

yields to permit of the manual movement of the body of the amplifier but holds it against being displaced by its own weight.

A yielding stop 48 of rubber or other suitable material is arranged in a recess in the upper surface of the front portion of the bracket 21 to engage against the under surface of the elbow 36 to hold the elbow when in its lowest position, and to prevent any injury to the machine by the accidental dropping of the body of the amplifier. The stop is preferably so positioned that it will hold the body 30 of the amplifier in a substantially horizontal position.

For supporting the cover 2 in any desired position, of movement about its hinges, a bar 50 is pivoted at one end upon a plate 51 attached to the inner surface of one side of the cover and is provided adjacent its opposite end upon its under edge with notches 52 adapted to receive a pin or cross bar 53 which extends across an aperture 54 in a plate 55 attached to the upper side of the horizontal partition 6, the partition being provided with an aperture registering with the aperture in the plate to permit the bar 50 to pass therethrough.

For automatically swinging the sound box arm about its horizontal pivot, and into inoperative position, as shown in Figs. 2 and 3, the U tube 16 is provided with a detachable sleeve 60 carrying therewith a crank arm 61 to the free end of which is pivoted one end of a rod 62, the other end of which is slidably mounted in an aperture provided therefor in the upper end of an upright standard 63 rotatably mounted upon a base 64 rigid with the partition 6 of the cabinet. An adjustable sleeve or stop 65 is slidably mounted upon the rod 62 and held in place by a set screw, and between this stop and the standard 63, the rod is surrounded by a spiral spring 66. The stop is so positioned on the rod 63 that when the sound box is in operation traveling across a record the spring will not be acted upon by any force tending to compress it, and will not have any influence upon the movement of the sound box, but when the box is lifted manually from its operative position and inverted over the sound box arm, the rod will be forced rearwardly by the crank arm through the standard 63 compressing the spiral spring 66. Upon the release of the sound box thus inverted, the compressed spring will expand against the stop forcing the rod outwardly and swinging the sound box arm outwardly and to one side of the body of the amplifier so that the amplifier may be swung into its lowest position without interfering with the sound box.

In operating the machine, the cover is first raised and held in suitable position by means of the notched bar 50, the amplifier is then raised and is automatically held in suitable



position by the spring 46 engaging in one of the recesses in the notched segment 45. A record is then placed upon the record support, whereupon the sound box arm may be swung into position and the sound box swung down into engagement with the record whereupon the actuating mechanism may be released. The amplifier may then be swung downwardly to bring the mouth of the amplifier below the adjacent end of the cover, and if preferred, to bring the amplifier into a substantially horizontal position as shown in Fig. 1. When not in operation, the machine is ordinarily kept with the sound box inverted upon its arm and at one side of the amplifier, and with the amplifier in its lowest position and resting upon the yielding stop 48, and with the cover closed upon the body of the cabinet.

The internal surfaces of the downwardly flaring sides of the cover form with the inner surface of the top of the cover a flaring reflector which may be inclined to direct the sound waves set up in the air within the cabinet surrounding the body of the amplifier, forwardly from the cabinet through the opening thus formed between the cover and the body of the cabinet, and these sounds would mingle with the sounds issuing from the mouth or delivery end of the amplifier and are thought to increase the efficiency of the machine.

Although only one form of this invention is here illustrated, it is obvious that the invention is not limited to the particular form shown, as many changes might be made in the construction without departing from the spirit of this invention or the scope of the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. The combination with a record support, of sound reproducing mechanism arranged to cooperate with said support, a jointed amplifier having independently movable sections comprising a movable delivery end mounted above said support, communicating with said reproducing mechanism, and a cabinet wholly inclosing said amplifier and having a cover movable independently of said delivery end.

2. In a talking machine, the combination with a record support, of sound reproducing means arranged to cooperate therewith, a jointed sectional amplifier having a major portion arranged above said support to swing upon a fixed axis, and a casing inclosing said amplifier and having a cover movable independently of said major portion upon an axis parallel with the axis of oscillation of said major portion.

3. In a talking machine, the combination with a sound box arm arranged to oscillate in a substantially horizontal plane, of a

sound box carried by said arm and movable with respect thereto, and means connected to said sound box whereby a movement of said box with respect to said arm reacts to effect a movement of said arm in its horizontal plane.

4. In a talking machine, the combination with a swinging sound box arm, of a sound box carried thereby and invertible with respect thereto, and means actuated by the inversion of said sound box to swing said sound box arm into inoperative position.

5. The combination with a movable support, of a sound box movably carried thereby and means actuated by a movement of said sound box with respect to said support for moving said support into an inoperative position.

6. In a talking machine, the combination with a sound box arm mounted to swing about a fixed axis, of a sound box pivotally supported thereon, and means actuated by a partial rotation of said sound box upon its axis with respect to said arm to swing the said arm into an inoperative position.

7. The combination with a sound box arm mounted to swing about a fixed axis, of a U-shaped tube rotatably mounted upon said arm, a sound box carried by said U-shaped tube, a crank arm rigid with said tube, a rod pivoted at one end of said crank arm, a rotary standard slidably supporting the other end of said rod, a stop arranged upon said rod, and yielding means between said stop and said rotary standard.

8. In a talking machine, the combination with a fixed member, provided with a cylindrical concave upper end, the axis of said concave end being substantially horizontal, and said upper end being provided with a vertical cylindrical opening therein, a tubular sound box arm having an upwardly turned end projecting rotatably within said opening, a spider fitting snugly within said opening above said end of said arm, and a vertical pivot having its upper end mounted in said spider extending through said arm, supporting said arm, a hollow elbow having a downwardly turned cylindrical convex end coaxial with the concave end of said bracket and cooperating therewith, and amplifying means supported by said elbow.

9. In a talking machine, the combination with a sound box, of a sound box arm supporting said sound box and restrained to swing in a fixed plane, amplifying means communicating with said sound box and restrained to swing independently thereof in a fixed plane transverse to the plane of movement of said arm, and a cabinet wholly inclosing, and having a cover movable independently of, said amplifying means.

10. In a talking machine, the combination with a record support, of sound reproducing means arranged to cooperate with a sound



record on said support, an arm carrying said sound reproducing means and mounted to swing across said record support, sound amplifying means cooperating with said sound reproducing means and arranged to swing independently thereof and toward and away from said record support, and a cabinet wholly inclosing, and having a cover movable independently of, said amplifying means.

11. In a talking machine, the combination with a record support, of sound reproducing means arranged to cooperate therewith, a sound amplifier having a major portion arranged above said support to oscillate about a predetermined horizontal axis, and a casing inclosing said amplifier and having a cover movable independently of said major portion upon an axis spaced from said first mentioned axis.

12. In a talking machine, the combination of a record support, of sound reproducing means arranged to cooperate therewith, a sound amplifier having a major portion mounted to oscillate about a predetermined axis and communicating with said sound re-

producing means, and a casing inclosing said amplifier, and having a cover movable independently of said major portion upon an axis spaced from said first mentioned axis, said major portion being held stationary during sound reproduction.

13. In a talking machine, the combination of a record support, of sound reproducing means arranged to cooperate with said support, a sound amplifier having a major portion above said support, of a casing entirely inclosing said amplifier, said casing comprising a body portion and a hollow cover arranged above said body portion and mounted to oscillate thereon, said major portion being arranged to deliver sound waves in a straight line through the space between said cover and said body portion when said cover is open.

In witness whereof, I have hereunto set my hand this 8th day of July, 1909.

JOHN C. ENGLISH.

Witnesses:

EDWARD KARCHER MACEWAN,  
CHARLES CHRISTOPHER MORE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



W. H. MILLER.

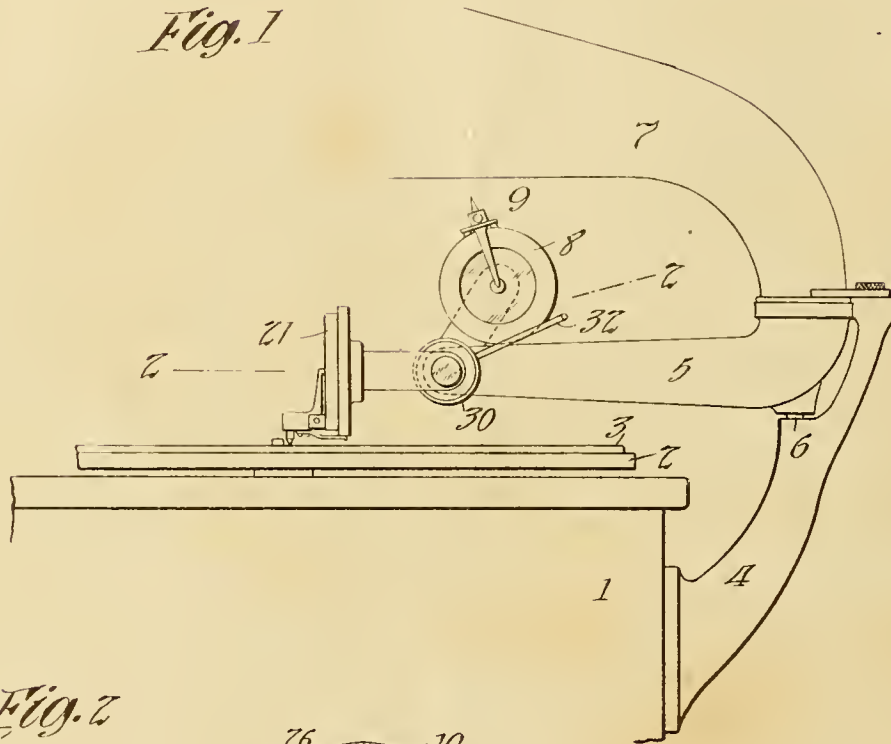
PHONOGRAPH.

APPLICATION FILED OCT. 21, 1911.

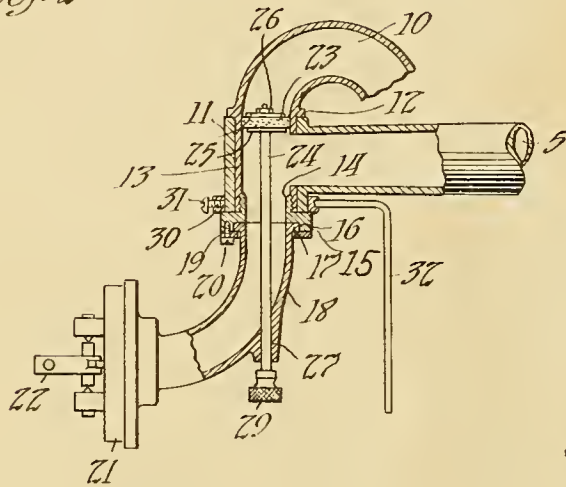
1,108,208.

Patented Aug. 25, 1914.

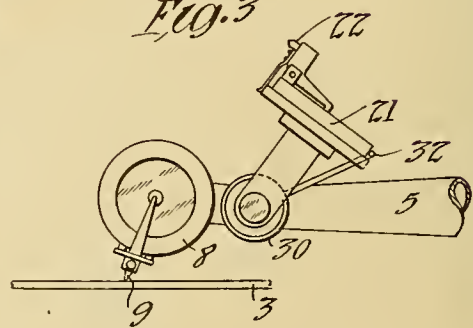
*Fig. 1*



*Fig. 2*



*Fig. 3*



*Witnesses:*

*Frank A. Lewis*  
*Eleanor Richman*

*Inventor:*

*Walter H. Miller,*  
*by H. H. Dyke*  
*his Atty.*



# UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, NEW JERSEY.

## PHONOGRAPH.

1,108,208.

Specification of Letters Patent.

Patented Aug. 25, 1914.

Application filed October 21, 1911. Serial No. 655,977.

*To all whom it may concern:*

Be it known that I, WALTER H. MILLER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification.

My invention relates to phonographs, and particularly to the provision of means for adapting a phonograph to reproduce sound from records of different types.

My said invention is preferably embodied in an attachment to a phonograph of well known form which is in common use and which is normally equipped with a reproducer adapted for reproducing from a sound record the record groove of which is of constant depth and laterally undulating. The reproducer point for playing such records is ordinarily known in the art as a "needle" and such needle and the reproducer or sound-box of which it forms a part are not adapted for playing records of other types, as for instance, the type of record in which the sound groove is vertically undulating. Records of the character last referred to, however, could be reproduced upon the phonograph to which I have referred without any change therein other than the substitution of a reproducer adapted for such records in place of that with which the machine is normally equipped and which carries a reproducing stylus of the needle type. In accordance with my invention a second reproducer is provided for this purpose. It is desirable that the attachment of such second or additional reproducer for the purpose of adapting the phonograph to play a different type of record shall be made as simply as possible and in particular that there be no necessity of doing machine work upon the phonograph to adapt it for the attachment of the additional reproducer, as there are large numbers of such machines of the type to which I have referred in the hands of users, who are not equipped to make such changes themselves and who would not go to the expense and trouble of having alterations made in their machines. I have therefore devised a means whereby an additional reproducer may be applied to such phonographs in an extremely simple manner and without the necessity of making any changes whatever in the machines now in existence beyond the simple removal of a nut and its replacement by other parts which

may be furnished with the additional reproducer.

Among the objects of my invention are the provision of novel means whereby a phonograph may be adapted for the reproduction of records of different types, the making of an attachment for the purpose named in such form that it can be readily attached to the phonograph without derangement of the parts thereof and without the necessity of doing machine or similar work upon the phonograph, the provision of means whereby the sound may be conveyed either from the reproducer with which the machine was originally equipped or from the reproducer of my attachment without loss or interference, and the provision of means for supporting the additional reproducer of my attachment in inoperative position where it will be out of the way when not in use.

With the above and related objects in view, my invention consists of the parts, improvements and combinations hereinafter set forth and claimed.

In the drawings forming a part of this specification, and wherein the same reference numerals are uniformly applied to designate the same parts throughout, Figure 1 is a fragmentary side elevational view of a phonograph of the type with which my attachment is adapted to be used, equipped with a second reproducer and embodying my invention; Fig. 2 is a view, partly in horizontal cross section, of the parts illustrated in Fig. 1, the sectional portion being taken on the broken line 2—2, Fig. 1; and Fig. 3 is a fragmentary side view similar to Fig. 1, but showing the two reproducers arranged in reverse relation from that shown in Fig. 1.

The reference numeral 1 indicates the cabinet of the machine, and 2 the rotating table on which the record is carried during reproduction; 3 the disk record from which the sound is to be reproduced; 4 indicates a bracket attached to the cabinet for carrying the sound conveying and amplifying means; 5 represents a portion of the sound conveying means which is ordinarily known as a tone arm and which is pivoted at 6 on the bracket 4, so as to rotate on a vertical axis. The amplifying portion of the horn is denoted by the reference numeral 7.

The phonograph which I have illustrated is of well known type and the reproducer



with which it is normally equipped is shown at 8, the reproducing point itself, which is of what is known as the "needle" type, being indicated at 9. This reproducer is adapted to reproduce sound from sound records having horizontally undulating grooves of even depth. This reproducer 8 is attached to the tone arm 5 by means of a curved connecting tube 10, which is rotatably received in the bore of the hollow cross-head 11 formed on the free end of the tone arm 5. The reproducer 8 being mounted in this manner, is swiveled to the tone arm 5 upon a horizontal axis and may be swung downward to rest upon the record, which position it occupies during the reproduction of the record, or it may be swung back to rest upon the top of the tone arm in which position it is left when not in use. In the known type of phonograph to which I have referred, the curved connection tube 10 is provided with shoulder 12 and with a straight portion 13 which fits within the transversely extending aperture in the cross-head 11 of the tone arm 5 and swivels therein, the connecting tube 10 being cut away where it communicates with the interior of the tone arm to permit the passage of sound. Ordinarily the end of the straight portion 13 of the connecting tube opposite the shoulder 12 receives a nut which is screwed within the threaded interior of said connecting tube and serves to provide an end bearing for the connecting tube. I take advantage of this construction in order to facilitate the attachment of my additional reproducer by removing the nut to which I have referred, and attaching additional parts of my own provision which I shall now proceed to describe. The nut itself is replaced by the member 14 which has the shoulder 15 bearing against the adjacent end of the cross-head 11, and which therefore serves all the functions of the nut which it replaces, as well as additional functions. This member 14 is cut away, as shown at 16, to receive the shouldered end 17 of a reproducer tube 18 which is swiveled therein: the plate 19 secured by screws 20 or equivalent devices retaining the shouldered portion 17 of the reproducer tube 18 in place within the member 13 and permitting it to swivel therein, as will be readily understood. The reproducer which forms a part of my attachment, is shown at 21. In the type illustrated, this reproducer carries a permanent reproducing point 22 which has a rounded end or is otherwise adapted for the reproduction of sound from grooves varying in depth instead of undulating transversely as is the case of the record grooves which are adapted to cooperate with the reproducer 8 and the needle 9. I also provide means for throwing the interior of the sound conveyer which comprises the tapering tone arm 5 and the amplifier 7 into

communication with the reproducer which is being used for the playing of records. In the device I have illustrated, this means for controlling the passage consists of a cork or other valve 23 which is secured to the stem 24, as by being placed between the plates 25, 25 and held thereon by the nut 26. Other forms of valve may of course be used for this purpose. The stem 24 extends through an opening 27 in the sound conveyer tube 18 which is in line with the axis of the swivel and is provided with a perfectly knurled knob 29. It will readily be understood that by pulling or pushing on the knob 29 either the reproducer tube 10 or the reproducer tube 18 may be thrown into communication with the interior of the sound conveying and amplifying mechanism.

I also preferably provide means for supporting my additional reproducer when not in use, as in the form illustrated it is evident that when swung back upon its swiveled mounting it will not be supported by the tone arm 5. Any form of support may be used within my invention. I prefer, however, to provide a form of support which may be readily supplied and which will not interfere in any way with the functions of the device and which may be attached without the necessity of any machine work being done on the phonograph. Such supporting means is illustrated in the drawing and comprises a collar 30 attached by screws or equivalent means 31 to the exterior of the cross-head 11 of the tone arm 5, and having attached thereto a wire or other arm 32 of convenient form to support the reproducer 21 when not in use. It will be seen that in the assembling of the parts, after the nut which is usually used in this form of phonograph has been dispensed with, the first operation is to place the collar 31 over the cross-head and secure it in place, after which the member 14 with the reproducer 21 attached is secured in place in lieu of the nut which is no longer required. In Fig. 1 the reproducer 8 is shown as supported on the tone arm 5 and the reproducer 21 is in operative position in contact with the record. In Fig. 3 the reproducer forming part of my attachment is shown as supported on the arm 32 and in this position it is inoperative. In this view the reproducer 8 is depressed and is in operative contact with the record for the reproduction of sound.

Having now described my invention, I claim:

1. In a phonograph, the combination with a hollow sound conveyer, of a plurality of reproducers secured thereto, and a hand operated push valve for throwing any one of said reproducers into communication with the interior of said sound conveyer, substantially as set forth.

2. In a phonograph, the combination with



a hollow sound conveyer, of a plurality of reproducers secured thereto, and a push valve in said sound conveyer and provided with an exteriorly projecting handle for throwing any one of said reproducers into communication with said sound conveyer, substantially as set forth.

3. In a phonograph, the combination with a hollow sound conveyer, of a reproducer swiveled thereto on one side, a second reproducer swiveled thereto on the other side, and a push valve in said sound conveyer for causing either of said reproducers to communicate with the interior of said sound conveyer at will, substantially as set forth.

4. In a phonograph, the combination with a hollow sound conveyer, of two reproducers adapted for reproduction from records of different types rotatably secured thereto, and a push valve in said sound conveyer for throwing either of said reproducers into communication with the interior of said sound conveyer, substantially as set forth.

5. In a phonograph, the combination with a hollow sound conveyer, of two separate reproducers swiveled thereto, and a single hand operated means for throwing either of said reproducers into communication with the interior of said sound conveyer, substantially as set forth.

6. In a phonograph, a sound conveyer, a pair of reproducers swiveled thereto at opposite points, a valve for throwing either of said reproducers into communication with the interior of said sound conveyer, and means located in the common axis of the swivels for operating said valve, substantially as set forth.

7. In a phonograph, the combination with a sound conveyer comprising a horizontally movable tone arm, of a reproducer, a connecting tube for said reproducer swiveled in the tone arm, a push valve in said connecting tube, a second reproducer, a connecting tube therefor, means for connecting said last named connecting tube with the first named connecting tube, said means also providing an end bearing for the first named connecting tube and an exteriorly project-

ing means for operating said push valve, substantially as set forth.

8. In a phonograph, the combination with a sound conveyer comprising a horizontally rotatable tone arm provided with an apertured cross head at its free end, of a reproducer a curved sound conveying tube connected to said reproducer and rotatively received within said cross head and provided with a shoulder limiting the extent of its entry into said cross head and also provided at its end with an internal screw thread, a second reproducer, a connecting tube communicating with said second reproducer, a member in which the last named connecting tube is swiveled to rotate, said member being provided with an external screw thread to fit within the internal screw thread in the end of the first named connecting tube said member also being provided with a shoulder which prevents endwise movement of the first named connecting tube when the parts are assembled, and means for supporting the last named reproducer when not in use, substantially as set forth.

9. As a new article of manufacture, an attachment for a phonograph, which phonograph comprises a tone arm, a reproducer and a connecting tube swiveled to said tone arm, said attachment comprising a curved connecting tube, a sound reproducer attached to one end thereof, said connecting tube being adapted to be swiveled at its opposite end to said tone arm opposite the connecting tube thereof and in line therewith, a valve adapted to close either of said connecting tubes and leave the remaining connecting tube in communication with said tone arm, and means extending through the wall of the attachment connecting tube for operating said valve, substantially as set forth.

In witness whereof, I have signed my name hereto in the presence of two witnesses, this 19th day of October, 1911.

WALTER H. MILLER.

Witnesses:

LOUIS C. GOETTING,  
MARJORIE KEEDWELL.



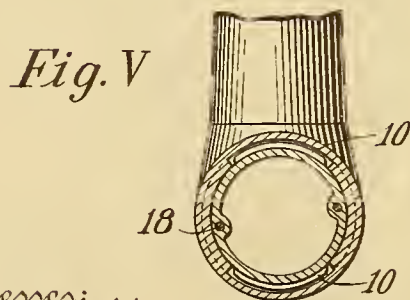
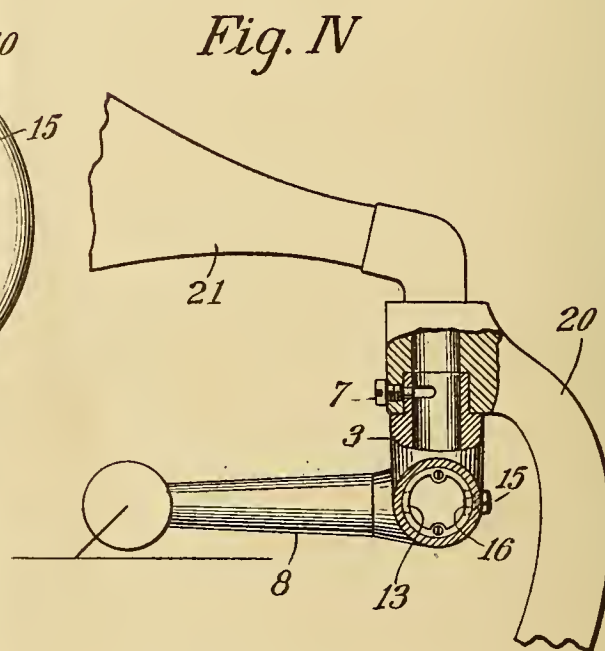
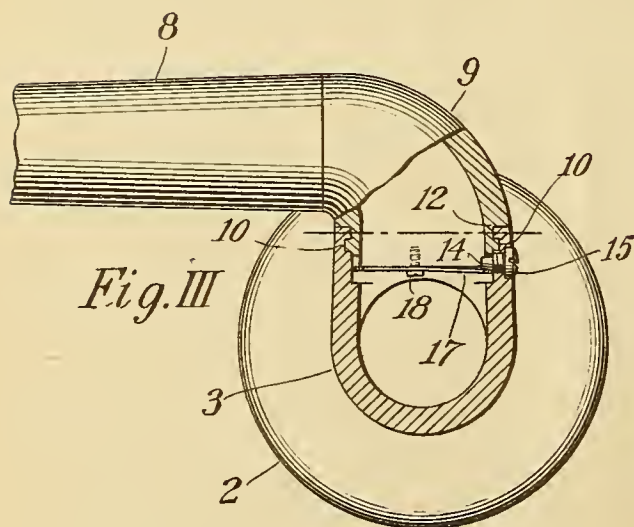
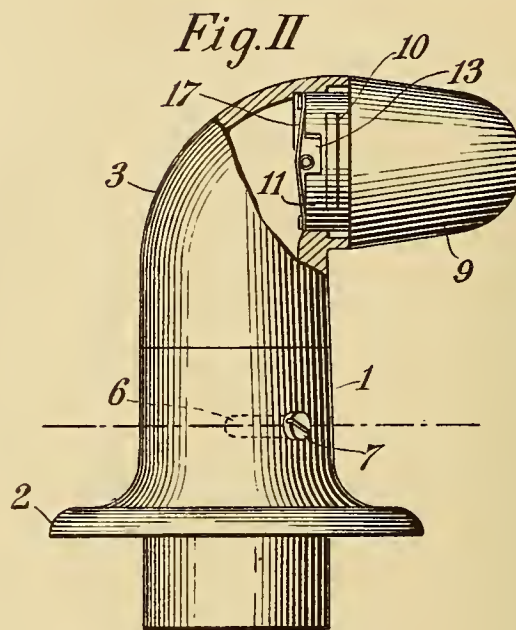
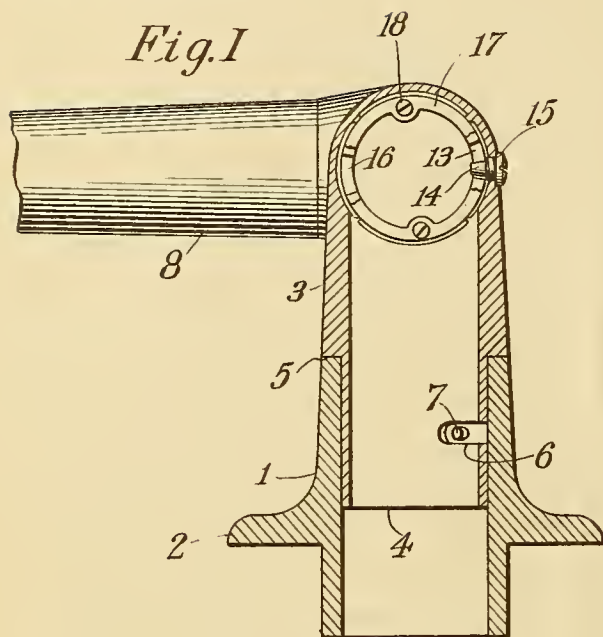




C. E. WOODS.  
TALKING MACHINE.  
APPLICATION FILED NOV. 30, 1912.

1,108,301.

Patented Aug. 25, 1914.



Witnesses:  
E. E. Warfield.  
Geo. H. Anderson.

Inventor  
Clinton E. Woods.  
By his Attorneys  
Mauro, Ameron, Lewis & Massie



# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## TALKING-MACHINE.

1,108,301.

Specification of Letters Patent.

Patented Aug. 25, 1914.

Application filed November 30, 1912. Serial No. 734,236.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

My invention relates to the sound-conveyer employed in talking-machines for connecting the sound-box with the amplifying horn. This conveyer is frequently referred to in the art as a "tone-arm."

One object of the invention is to produce a tone-arm that is correctly designed, from an acoustical point of view, and with a continuous and unobstructed passage-way for the sound-waves from the vibrating diaphragm to the horn.

Another object is the production of a tone-arm which shall be free from vibration and free from rattling of the parts, yet capable of universal movement.

A further object is the production of a standardized tone-arm,—that is, one which can be used to equal advantage on a "visible horn" machine or a "concealed horn" machine,—at the same time being simple and efficient in construction, and attractive in appearance.

The invention will be best understood by reference to the accompanying drawings, in which—

Figure 1 is a side view of a portion of the so-called "tone-arm" or sound-conveyer, mounted for use with a "concealed horn" talking-machine so-called, showing the mounting therefor in vertical section; Fig. 2 is an end view of the same, looking from the right of Fig. 1, and partly in section; Fig. 3 is a plan view of Fig. 1, partly in horizontal section; Fig. 4 is a side view showing the tone-arm in connection with a "visible horn" machine; and Fig. 5 is a sectional view showing details.

Referring to Figs. 1-3, 1 represents the stationary member, shown as a vertical tube or sleeve having a horizontal flange 2, and adapted to be secured upon the supporting-shelf of the cabinet (or upon the base-plate of the talking-machine), to communicate with the smaller end of the usual stationary sound-conveyer or "horn" contained within the cabinet (but not shown). 3 is the tubular intermediate member or elbow, having

the reduced portion 4 fitting snugly within the bore of the stationary member 1, and having the shoulder 5 resting upon the upper end of the same. 6 is a horizontal slot in the reduced portion 4, and 7 a set-screw carried by the stationary member and entering said slot to limit the axial movement of the elbow, and also serving to prevent withdrawal thereof. 8 is the swinging sound-conveyer or "tone-arm," having the proper taper, and carrying at its outer end any suitable sound-box (not shown), and at its inner end curved (in a horizontal plane) to present the elbow 9. This elbow 9 is swiveled to the intermediate elbow 3 so as to swing in a vertical plane, so that by reason of this joint and the swiveling of the intermediate member in the stationary member 1, the sound-box can have universal movement.

More specifically, the tone-arm and the intermediate member are detachably connected by a breech-lock or bayonet-joint coupling, in which 10-10 represent an interrupted radial flange carried by the reduced cylindrical portion 11 of the elbow 9 to constitute the male member; and 12 (Fig. 3) is the interrupted internal flange carried by the elbow-member 3 to provide an annular groove, thus constituting the female member for receiving the interrupted flange 10. The end-face of the reduced portion 11 is cut away at 13, to receive the tapered stop-pin 14 which projects from the set-screw 15 carried by the intermediate member 3. Diametrically opposite this cut-away 13, is a similar cut-away 16, for the purpose to be described later.

17 is a thin ring of spring material, secured, as by screws 18, upon the end-face of the reduced portion 11, concentric therewith, and adapted to bear upon the tapered stop-pin 14, to prevent any looseness of parts and consequent rattle. By turning the set-screw 15 in or out, the tensioned engagement between the spring 17 and the stop-pin 14 can be properly adjusted.

It will be observed that there is a continuous and uninterrupted passageway from the sound-box—through the tone-arm, the intermediate elbow, and the stationary member—into the stationary horn; and that there are no projections (of fastening-devices or the like) into this passageway, nor are there any such external projections. Furthermore,



owing to the fewness of parts and their simplicity of construction and directness of connection, and the consequent absence of rattle, the present construction permits dispensing  
 5 with the soft-rubber insulation heretofore commonly employed in connecting the sound-box to the tone-arm. Indeed, the sound-box may be made integral with, or secured directly and rigidly to, the end of the  
 10 tone-arm.

Referring now to Fig. 4, 20 represents the supporting-bracket commonly employed in "visible horn" machines, to which any suitable horn 21 is secured in any convenient  
 15 usual manner. The same intermediate elbow 3 has, however, been turned upside down, and its reduced portion 4 is journaled within the bracket, so that the elbow itself depends therefrom. The set-screw 15 has been re-  
 20 tracted, so as to permit the tone-arm 8 to be swung through an angle of  $180^\circ$  in order to bring the sound-box and its stylus into proper position; and the set-screw 15 has then been restored to place, engaging with  
 25 the second cut-away 16. In short, by means of the present invention the tone-arms and the intermediate elbows are standardized and can be put in stock, ready for use as desired, either upon the "concealed horn"  
 30 machines or upon the "visible horn" machines, which greatly simplifies and cheapens manufacturing-operations. And, in either service, the structure is of the greatest efficiency.

I have thus described my invention with  
 35 considerable detail, but only for the sake of clearness, since my invention is not limited to the details of construction and arrangement above set forth, but may be modified  
 40 considerably without departing from the spirit of the invention. For instance, the male and female, coupling-members might be mutually transposed, or some other  
 45 form of coupling employed; the anti-rattling spring 17 might be dispensed with al-

together, or some other anti-rattler employed; and other changes made without departing from the broad invention.

Having thus described my invention, I  
 claim:

1. In a tone-arm for talking machines, a  
 50 vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a bayonet-joint connection between said horizontally  
 55 extending members, and a spring mounted on one of said members and reacting against the other, the tendency of said spring being to force said members apart.

2. In a tone-arm for talking machines, the  
 60 combination of a vertical member having a horizontally extending elbow and a horizontal member having a corresponding horizontally extending elbow, one of said elbow  
 65 members having interiorly formed bayonet-joint elements and the other elbow member having corresponding bayonet-joint members on the reduced end thereof, and a spring  
 70 mounted on said reduced end and bearing against the other member.

3. In a tone-arm for talking machine, the  
 combination of a vertical member having a  
 horizontally extending elbow and a horizontal  
 member having a corresponding horizontally  
 75 extending elbow, one of said elbow members having interiorly formed bayonet-joint elements and the other elbow member having corresponding bayonet-joint members  
 80 on the reduced end thereof, a spring mounted on said reduced end and bearing against the other member, and means for adjusting the tension of said spring.

In testimony whereof I have signed this  
 specification in the presence of two subscribing  
 witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

JOHN S. GRIFFITH.





1,108,302.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Inventor

Clinton S. Woods.

Attorneys

Mauro, Cameron, Lewis & Massey

Jas. H. Anderson.

E. E. Warfield

# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN  
GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION  
OF WEST VIRGINIA.

## TONE-ARM FOR TALKING-MACHINES.

1,108,302.

Specification of Letters Patent.

Patented Aug. 25, 1914.

Application filed August 30, 1913. Serial No. 737,461.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Tone-Arms for Talking-Machines, which invention is fully set forth in the following specification.

The present invention relates to tone-arms for talking machines, the object of the invention being to provide a device of the character described which will permit the sound-box to have an universal movement, which will be as nearly as possible perfect acoustically and mechanically, and in which the possibility of sympathetic vibration will be reduced to a minimum. Briefly stated, these objects are attained by providing in the tone-arm a continuous, constantly expanding uninterrupted passage, to the end that the sound waves are delivered with an increased volume; and in reducing to a minimum the number of parts and uniting the several members of the tone-arm by smooth, tight, practically frictionless joints which obviate the possibility of rattling and the introduction of any extraneous sound.

The improved tone-arm is provided with a horizontal section and a vertical section, and the horizontal section is preferably secured to the vertical section by a bayonet-joint connection which is entirely concealed and thoroughly effective and durable.

The present invention is such that, while the volume of sound is increased, the size of the tone-arm is largely decreased over those heretofore employed.

The invention will be better understood by reference to the accompanying drawings, illustrating one mechanical expression of the inventive idea, and in which:—

Figure 1 is a perspective view of the tone-arm; Fig. 2 is a vertical section, partly in elevation; Fig. 3 is a detail, showing various coacting parts separated; and Fig. 4 is a section on line 4—4 of Fig. 2.

Referring to the drawing, wherein like reference numerals indicate like parts in the several views, 5 indicates a hollow support on which the tone-arm is mounted. Said tone arm is made up of a plurality of sections, preferably a vertical section 6 provided with a horizontally extending elbow 6', and a horizontal section 7 provided with a horizontally extending elbow 7'. On the

free end of the horizontal section is secured a casing 8, to which the sound-box is connected in any usual or suitable manner. The section 7 has an uninterrupted passage that continuously expands from the casing 8 to the point where said section is jointed to the section 6, this passage continuing through said section 6 without interruption, to the end that the sound waves are delivered without variation or distortion. Preferably, the section 7 is a one-piece, seamless, drawn tubing, as is also the section 6.

In order that the joint between sections 6 and 7 may be tight and smooth and practically frictionless, to the end that extraneous noises may be excluded and wear practically eliminated, the end of section 7 is reduced at 9, forming a continuous shoulder 10 that bears against the end 11 of the section 6. The two sections are preferably secured together by a bayonet joint, constituted by ribs 12 and 13 on section 7 and ribs 14 and 15 on section 6. To the end of reduced portion 9 is secured, by screws 16 and 17, a flat annular spring 18 that presses against a ridge 19 in section 6 when the parts are assembled, thus maintaining the joint tight and preventing any rattling. A stop is provided for limiting the movement of the tone-arm in a vertical plane, which stop, as here shown, is in the form of a pin 20 extending through an opening 22 in the section 6 until its inner end enters a shouldered slot 21 formed in the reduced portion 9 of the tone-arm 7.

In order that the horizontal movements of sections 6 and 7 may be readily and noiselessly effected, the annular lower end of section 6 rests upon the annular upper end of the hollow support 5.

Secured in any desired manner to the inside of section 6, in order to rotate therewith, is a sleeve 23 of suitable material, said sleeve projecting down into the support 5 and being provided with a slot 24 in which engages a pin 25 carried by the support 5, whereby the horizontal arc of movement of the tone-arm is limited. The sleeve 23 is provided at its lower end with two diametrically disposed notches 26, into which project tongues 27 similarly arranged on a ring 28 provided with parallel slits 29 and ridge 30. The lower end of said ring 28 is adapted to be



snapped into an annulus 31 provided with a lug 32. This annulus has bearing in a recess 33 in the hollow support 5, being introduced therein through a slot 34 in said support and rotating on said bearing when the tone-arm moves horizontally. The extent of movement of said annulus is limited by said slot. The lug 32 may be connected to any desired mechanism which it is desired to operate by the movement of the tone-arm as, for example, the start-and-stop mechanism.

It will be understood that the lower face of flange 35, here shown as integrally formed on the horizontal support 5, rests upon the motor board or the machine casing.

The various parts described are assembled by first introducing the annulus 31 through the slot 34 onto its bearing 33, and then snapping the lower end of ring 28 through the opening in said annulus until the ridge 30 bears upon the former. Sleeve 23 which is fixedly secured to section 6 is then introduced into the hollow support 5 until lugs 27 engage the recesses 26 and the lower face of section 6 rests upon the upper face of support 5. Screw 25 is then put in place with its point engaging in the slot 24 of sleeve 23. It now only remains to place section 7 in position, and this is readily effected by turning said section into a vertical position and introducing it into the open end of section 6 until spring 18 presses against the ridge 19. The spring is thus placed under tension and the section is turned down to the position indicated in Fig. 1, with its lugs or ribs 12 and 13 engaging the rear faces of lugs or ribs 14 and 15. The screw 20 is then placed in position to limit the vertical movement of section 7, and the parts are now in position for operation.

The tone-arm as thus produced is smaller in size than those heretofore employed, is very simple in construction and effective in

operation, is highly attractive in appearance, and is acoustically and mechanically correct, and the parts are readily constructed, assembled and disassembled.

While, for the purpose of clearness, there is herein illustrated and described in detail one expression of the inventive idea, it is to be understood that the invention is not limited to the construction shown, but that the inventive idea is susceptible of many mechanical expressions within the limits of the claims appended hereto.

What is claimed is:—

1. In combination, a tone-arm having a vertical section and a horizontal section, a hollow support on which the vertical section rests, a sleeve secured to said vertical section and projecting into said support, a split ring connected to said sleeve to participate in its rotary movements, and an annulus member secured to said split ring.

2. In combination, a tone-arm having a vertical section and a horizontal section, a hollow support on which the vertical section rests, a part moving with said vertical section and projecting into said support, means connected to the lower end of said projecting part to participate in its rotary movements, and a member secured to said means.

3. In combination, a tone-arm having a vertical section and a horizontal section, a hollow support on which the vertical section rests, a sleeve secured to said vertical section and projecting into said support, means connected to the lower end of said sleeve to participate in its rotary movements, and a member secured to said means.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

JOHN S. GRIFFITH.



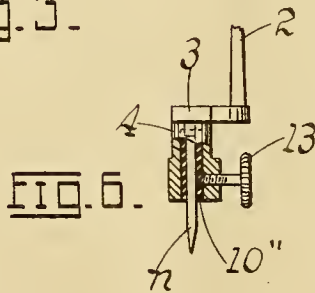
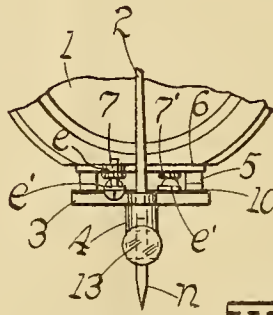
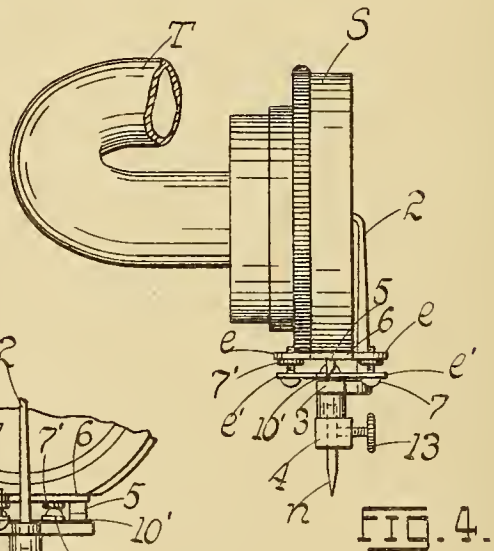
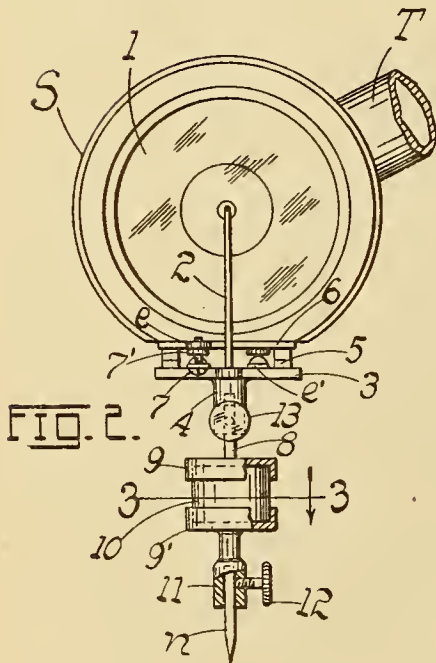
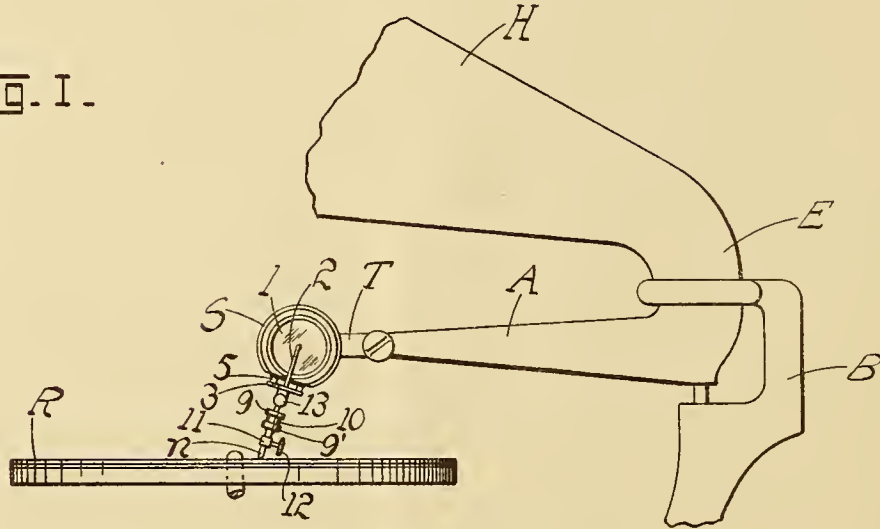


A. S. B. LITTLE.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED FEB. 20, 1914.

1,108,451.

Patented Aug. 25, 1914.

FIG. 1.



WITNESSES:

Harry A. Reimer  
Joseph M. Chief

INVENTOR.

Archibald S.B. Little.

BY

Emil Haren  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

ARCHIBALD S. B. LITTLE, OF NASHVILLE, TENNESSEE.

SOUND-REPRODUCING MACHINE.

1,108,451.

Specification of Letters Patent.

Patented Aug. 25, 1914.

Application filed February 20, 1914. Serial No. 820,022.

*To all whom it may concern:*

Be it known that I, ARCHIBALD S. B. LITTLE, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in sound reproducing machines and it consists in the novel details of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of a disk sound reproducer showing the application thereto of one form of my invention; Fig. 2 is an enlarged face elevation of the invention proper; Fig. 3 is a horizontal cross-section on the line 3—3 of Fig. 2; Fig. 4 is an edge view of a conventional sound-box showing a modified form of my invention; Fig. 5 is a face elevation of the lower portion of the modification shown in Fig. 4; and Fig. 6 is a sectional detail of a still further modification.

The present invention is specifically directed to improvements in sound reproducing machines (though likewise applicable to sound recorders) and has for its primary object to eliminate all sounds which are foreign to those intended for reproduction from the record. Among such undesirable sounds may be mentioned (1) the metallic noises usually accompanying the sounds reproduced from the record, and (2) noises resulting from imperfections in an old or worn-out record, such noises being usually accompanied by cracking sounds or jars which mar or interfere with the transmission of the sound waves translating the record impressed on the record-disk or cylinder as the case may be.

By the use of my invention all noises, and mechanical vibrations not intended for translation and transmission, and which are foreign to and out of attunement with, the sounds intended to be reproduced are segregated and absorbed so that the same become practically inaudible, thus making the legitimately transmitted sounds emanating from the record-disk, clear and wholesome.

The advantages of the invention will be

best apparent from a detailed description thereof which is as follows:—

Referring to the drawings, and for the present to Figs. 1 and 2, B represents the bracket supporting the horn-elbow E, the horn or sound-chamber, H, and tone-arm A, the latter having pivoted thereto the sound-box tube T which carries the sound-box or reproducer S, as well understood in the art. As further well understood in the art, the diaphragm 1 of the reproducer is coupled by an arm 2 to a plate 3 which carries the needle-socket 4, the plate 3 bearing against the knife-edges 5, of the plate 6 of the reproducer, connection between the plates being effected by means of adjusting screws 7, passed respectively through lugs or lobes *c* on the plate 6 and through the spring arms *c'* secured to the plate 3, the screws being provided with jam-nuts 7' as shown. The several features described are well known and common in the art, and are illustrated here more or less conventionally, being in no wise concerned with the present invention.

As stated at the outset, the main object of my invention is to segregate and absorb all sounds and mechanical vibrations which interfere with the free and unrestricted propagation of sound waves which are intended to reproduce or translate the matter on the record-disk or plate, or equivalent recording member. The invention may thus be appropriately termed a sound absorber, it being understood however that while it absorbs undesirable sound-waves and mechanical and metallic vibrations, it is free to transmit the legitimate waves engendered by the record-plate to which the transmitting needle or stylus is applied.

In the form of my invention illustrated in Figs. 1 and 2, the usual needle-socket 4 receives the stem 8 of a metallic cup or flanged disk or head 9, between which and a similar head or disk 9' is confined a cylinder of rubber 10 or equivalent resilient sound-wave absorbent material, the members 9, 9' being maintained out of contact with one another by the member 10. The disk 9' is provided with a needle-socket 11 which receives the needle or reproducing stylus, *n* operating on the conventional record-disk or plate R as well understood in the art, a screw 12 holding the needle in place in its



socket. The members 8, 9, 9', 10, 11, 12 form a single attachment or needle-support adapted to be secured to what usually constitutes the needle-socket 4, said socket receiving the stem 8 which is held in the socket by the usual clamping or set-screw 13.

In Figs. 4 and 5 the absorber is in the form of a rubber or equivalent strip 10', interposed between the plate 3 and the knife-edges 5. In this modification the needle *n* is inserted into the usual socket 4, it being understood that the construction illustrated in said Figs. 4 and 5 is the same as that illustrated in Figs. 1 and 2, corresponding parts being identified by the same reference symbols. The difference between the first form described, and that of the modification alluded to is in the location and manner of attaching the absorber member (10').

In Fig. 6, the absorber member is in the form of a rubber or equivalent bushing 10'' inserted in the needle socket 4, the needle *n* being received by the bushing. It will thus be seen that the invention is susceptible of various modifications, the generic feature thereof however residing in the interposition of a suitable sound-absorber between the needle *n* and the sound-box or reproducer S, or more broadly speaking, between the needle *n* and the sound-chamber or horn H.

Preferably, the composition of the absorber 10 (10' 10'') is soft rubber, though I do not wish to restrict myself thereto, it falling within the scope and contemplation of my invention to employ any substance (preferably non-metallic) which has the capacity to transmit the sound waves translating the matter on the record-disk, and at the same time to absorb mechanical vibrations and sounds out of atunement with, or foreign to, the record. The substance must possess the necessary elasticity to transmit legitimate waves, but must at the same time segregate and absorb the undesirable waves. Metallic substances are not to be eliminated if they have the properties necessary to fulfil the de-

sired function. My attachment therefore has the capacity of maintaining the members T, A, E, H, and the air in the sound passages thereof in perfect atunement with and responsive to, the sound-waves engendered within the sound-box or diaphragm cell S. The absorption of undesirable waves should be at a point as near the needle as possible, such waves being usually produced by the needle operating over an imperfect, "cracked" or worn-out record-disk. In other words, the interception of the undesirable waves should take place before the legitimate waves reach the sound-box. As well understood in the art, the needle *n*, and the walls of the members S, T, A, E and H are made of metal, the needle being of steel and the other parts of instrument brass.

In the claims, the expression "sound absorbing member" or "sound absorber" is to be understood as covering any material having the property of absorbing waves or sounds which are foreign to the record, the legitimate record-waves being of course transmitted, and not absorbed.

Having described my invention what I claim is:—

1. In a machine of the character described, and in combination, a needle-support comprising a rubber member, terminal flanged disks carried thereby and spaced apart, a stem leading in one direction from one of the disks, and a needle-socket leading in the opposite direction from the opposite disk.

2. In a machine of the character described, and in combination, a needle-support comprising a sound-absorber member provided with terminal metallic heads or members spaced apart, a stem on one of the heads, and a needle-socket on the opposite head.

In testimony whereof I affix my signature, in presence of two witnesses.

ARCHIBALD S. B. LITTLE.

Witnesses:

EMIL STAREK,  
JOS. A. MICHEL.



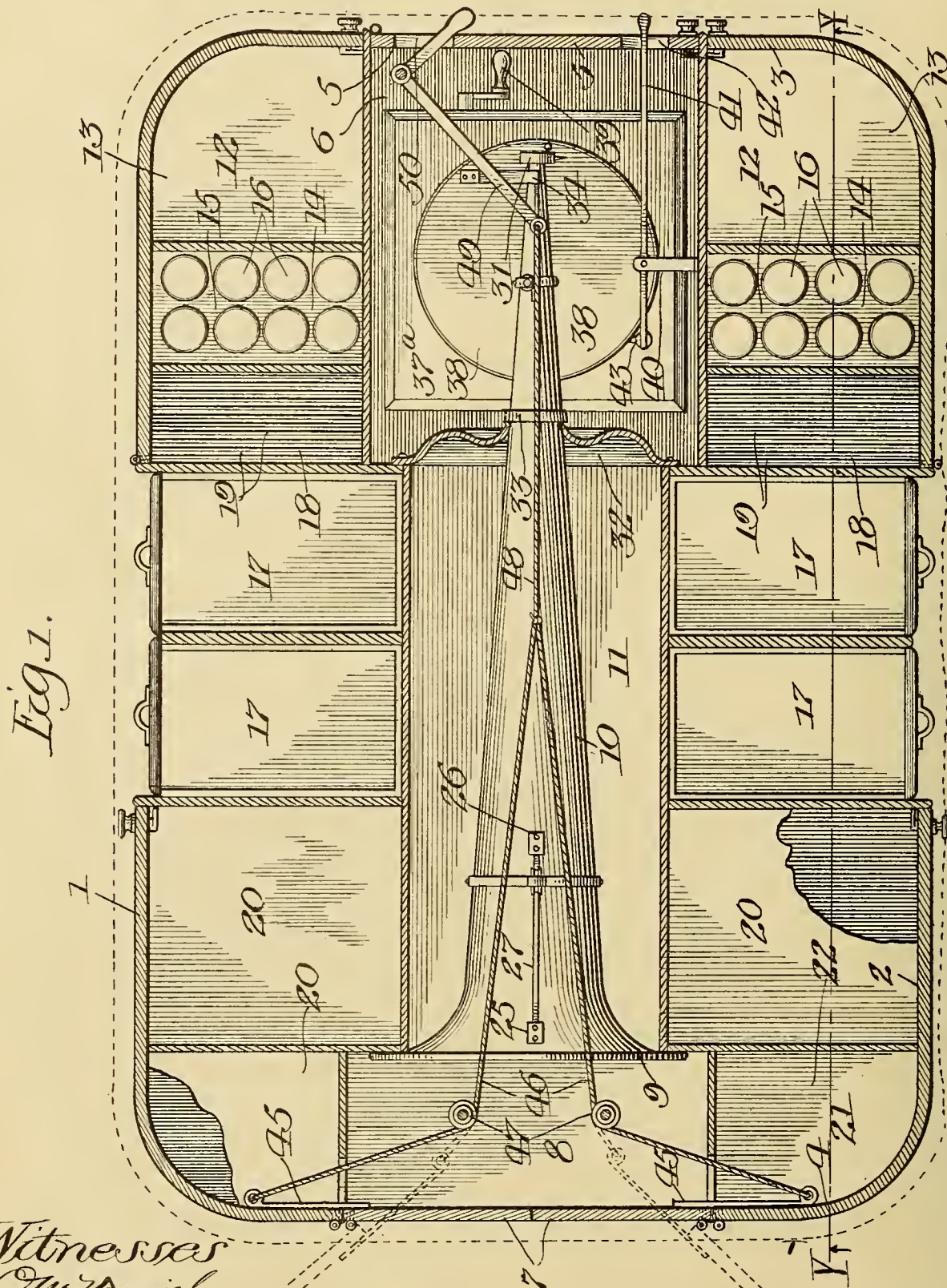


H. A. BORRESEN.  
CABINET FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED NOV. 9, 1908.

1,109,386.

Patented Sept. 1, 1914.

4 SHEETS—SHEET 1.



Witnesses  
Chas. J. Smith  
Chas. J. Smith

Inventor  
Helge A. Borresen  
by Benj. T. Roodhouse Atty



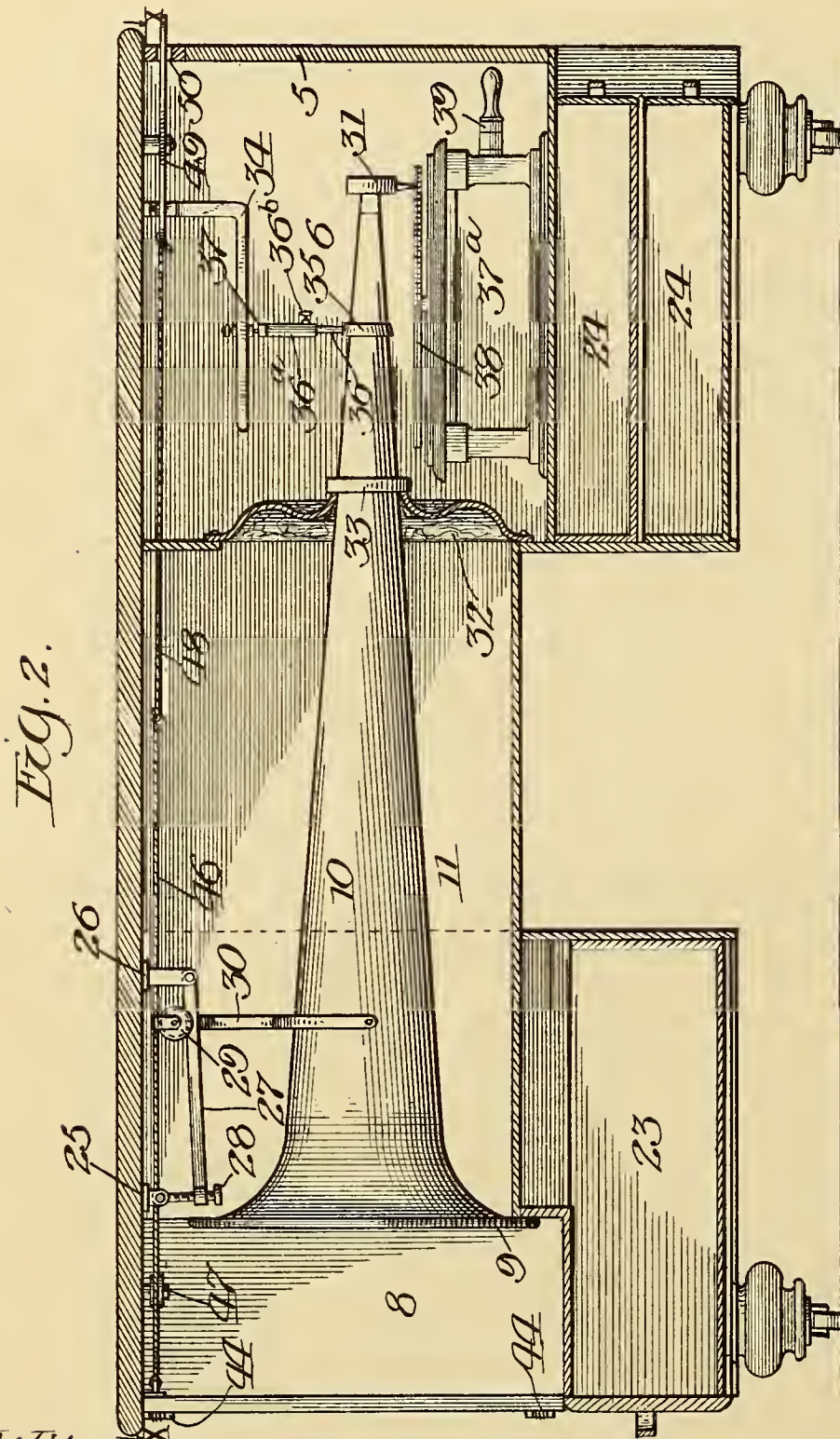


H. A. BORRESEN.  
CABINET FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED NOV. 9, 1908.

1,109,386.

Patented Sept. 1, 1914

4 SHEETS—SHEET 2.



Witnesses:  
O. M. Samuel  
C. M. Peterson

Inventor  
Helge A. Borresen  
by Benj. T. Lovelace  
Atty



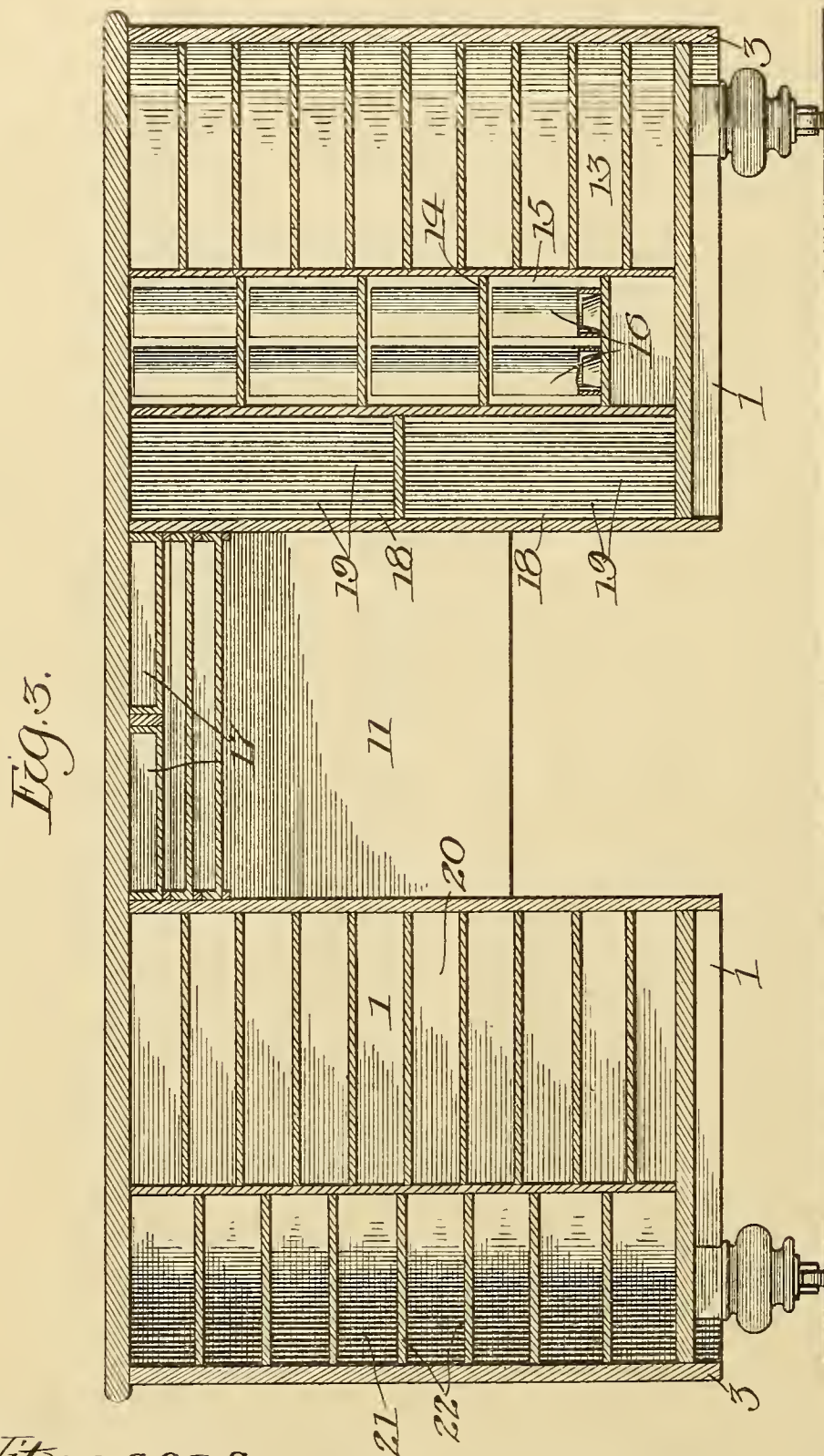


H. A. BORRESEN.  
CABINET FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED NOV. 9, 1908.

1,109,386.

Patented Sept. 1, 1914.

4 SHEETS—SHEET 3.



Witnesses  
O. J. Jernick  
O. M. Jernick

Inventor  
Helge A. Borresen  
by Benj. T. Roebuck atty

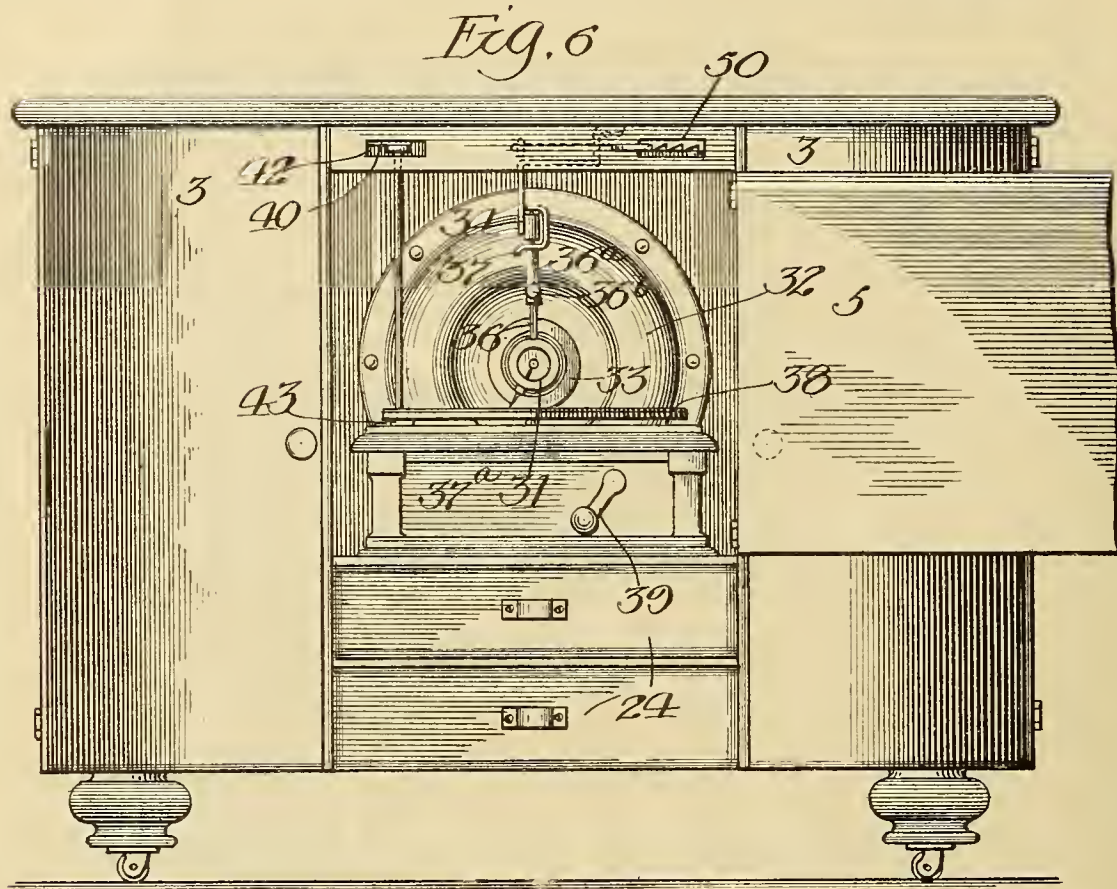


H. A. BORRESEN.  
CABINET FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED NOV. 9, 1908.

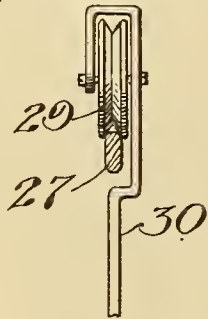
1,109,386.

Patented Sept. 1, 1914.

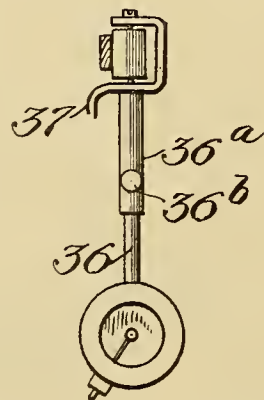
4 SHEETS—SHEET 4.



*Fig. 4.*



*Fig. 5.*



Witnesses  
C. M. Harrison  
C. M. Harrison

Inventor  
Helge A. Borresen  
by Benj. T. Roodhouse  
Atty



# UNITED STATES PATENT OFFICE.

HELGE A. BORRESEN, OF MARQUETTE, MICHIGAN.

CABINET FOR SOUND-REPRODUCING MACHINES.

1,109,386.

Specification of Letters Patent.

Patented Sept. 1, 1914.

Application filed November 9, 1908. Serial No. 461,739.

*To all whom it may concern:*

Be it known that I, HELGE A. BORRESEN, a citizen of the United States, and a resident of the city of Marquette, in the county of Marquette and State of Michigan, have invented a certain new and useful Cabinet for Sound-Reproducing Machines, of which the following is a specification.

My invention has relation to improvements in cabinets for sound reproducing machines, and has for its special objects; first, the provision of such a cabinet in such form that it may be embodied in a desk, cabinet table, or other like piece of furniture; second, the provision in such a cabinet of an arrangement which will permit the amplifying or delivery horn to extend directly without turn or bend at right angles from the sound head and vibrating membrane; third, the provision in such a cabinet of simple means for assisting the feeding of the stylus over the record, and fourth the provision of simple means for operating my cabinet from one position.

To effectuate the above objects, I have provided the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan, partially in section, of a cabinet table embodying my invention, taken on the line X—X of Fig. 2; Fig. 2 is a central, longitudinal elevation of my invention partially in section; Fig. 3 is a longitudinal sectional elevation taken on line Y—Y of Fig. 1; Fig. 4 is a detail of the adjustable inclined horn-suspending feeding rail; Fig. 5 is a detail of the sound head guide rail, and Fig. 6 is an end elevation of the cabinet table showing the doors to the phonograph compartment open.

Similar reference numerals refer to similar parts throughout the several views.

The reference numerals 1 and 2 designate the sides, or side walls of the cabinet table in which I have embodied my invention, and the numerals 3 and 4 designate the end walls thereof. In the end, 3, is provided the door, 5, which opens into the compartment, 6, for the sound reproducing machine. In the end, 4, are provided the double doors, 7, which open into the compartment, 8, occupied by the flaring end, 9, of the amplifying or delivery horn, 10.

A reduced compartment, 11, of sufficient size to accommodate the gradually tapering

portion of the amplifying or delivery horn, 10, connects the compartments 6 and 8.

I have illustrated the sides of the cabinet table, not occupied by my sound reproducing machine cabinet, divided into a number of useful compartments. For instance the compartments 12 may be made to swing out and be provided with shelves, 13. The compartments 14 may be provided with shelves, 15, and with means for holding cylinder records, 16.

The central portion of the table I have only provided with the drawers, 17, and have left the bottom thereof open so that the table will accommodate the knees of a person desiring to use it as a desk. The compartments 18 are shown of such size and construction to accommodate disk records, 19, as my cabinet will accommodate either a cylinder of a disk machine, as will be hereafter explained. The compartments, 20, may be used for rolls of music for a piano player, and the compartments 21 are provided with the shelves, 22, which may be used for any desired purpose. In each end, under the doors 5 and 7 respectively are provided the drawers 23 and 24.

The compartment 8 is made of sufficient depth to permit the flaring portion of the horn, 9, to move forward therein as the sound head is fed across a disk record. Centrally located in the top of the compartment, 11, just back of compartment 8, are the depending brackets, 25 and 26. To the lower end of the bracket 26 is pivoted the rail, 27. Through the other end of the rail, 27, passes the mill-headed screw 28, the upper end of which engages the bracket, 25. Traveling upon the rail 27 is the grooved wheel 29, from which depends a strap 30, the lower end of which is made into a yoke, the arms of which are pivoted to the amplifying or delivery horn, 10. The top of the rail, 27, is oval in cross-section, while the groove in the wheel 29, is angular, thus permitting a horizontal movement of the horn, 10. It will now be seen that by adjusting the screw 28 the rail 27 may be given any angle. The wheel, 29, will tend to roll along the rail, 27, to its lowest point, thereby carrying the horn, 10, along with it. The sound head 31, which is attached to the small end of the horn 10 will thereby be fed across the record by gravity, and the amount



or strength of pull can be regulated by the inclination of the rail, 27.

To prevent the mechanical noise from passing from the compartment 6, I have provided the funnel-shaped flexible curtain, 32, the central portion of which is attached to the ring, 33. The small end of the horn is passed through the ring, 33, which is drawn up over the tapering sides of the horn until a snug fit is secured. The flexible curtain 32 will permit sufficient longitudinal motion of the horn to accommodate the feeding of the sound head.

From the top of the compartment 6 extends downwardly and inwardly the sound head guide rail 34. Around a convenient portion of the small end of the horn is the ring, 35, upwardly from which extends the rod 36, over which slips the tube, 36<sup>a</sup>. The tube, 36<sup>a</sup> is attached to the rod, 36, by the set screw 36<sup>b</sup>, thereby permitting of a vertical adjustment of the tube 36<sup>a</sup>. The tube 36<sup>a</sup> extends upward to contact with the sound head guide rail 34, and prevent the rotation of the disk from carrying the sound head around with it instead of carrying the record beneath the sound head. I have provided well down upon the tube 36<sup>a</sup> the hook 37, which can be hooked over the sound head guide rail 34 to keep the sound head up out of contact when it is desired to change records.

In using a cylinder machine the entire tube, 36<sup>a</sup>, is removed.

It is well known that bends in the sound conduit tend to muffle the sound, and it will now be perceived that my cabinet permits the sound to pass directly from the vibrating diaphragm in the sound head to the audience. This arrangement also permits the use of either cylinder or disk machines in my cabinet.

I have shown a disk machine, 37<sup>a</sup>, in Figs. 1, 2 and 6 of the drawings, having the disk, 38, in assembly therewith. The winding of the machines is done in the usual way by means of the crank 39, when the door, 5, of the compartment, 6, is open.

To start or stop the machine, I provide upon the side of the compartment, 6, the bracket, 40, to which is pivoted the arm, 41, the outer end of which projects through an aperture, 42, in the wall, 3, and the inner end of which engages and operates the ordinary break mechanism, 43, usually provided upon such machines.

The doors, 7, which open upon the flaring end, 9, of the amplifying or delivery horn, 10, are held normally closed by the hinge springs, 44, clearly shown in Fig. 2. From the top rear faces of the doors, 7, extend outwardly, substantially in a line with their said rear faces, the arms, 45. From the outer ends of the arms, 45, run the cords, 46, to the pulleys, 47, pivoted to the under

side of the table top in the compartment 8. From the pulleys 47, the cords 46 run inwardly to a point where they both connect with the line, 48, which in its turn runs into the compartment 6, where it connects with the inner end of an L-angled or bell lever, 49, which is pivoted in such a manner that its other end extends through an aperture, 50, in the end, 3, of the table.

It will be observed that after a record has been put in position upon the machine, and the machine wound, the door, 5, may be closed to keep in the mechanical sounds. The operator may then start the machine by means of the arm 41, and gradually open the doors 7 by means of the bell crank or lever, 49, which operates through the line, 48, cords, 46, and arms, 45, until a sufficient volume of sound, according to the nature of the piece and size of the room, is permitted to escape. In Fig. 1 the doors 7 are shown in open position by dotted lines.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A cabinet for sound reproducing machines comprising a compartment, a movable horn a horn supporting means therein, another compartment situated at one end of said first mentioned compartment, and a flexible partition between said compartments having an opening for said horn therein.

2. In a cabinet for sound reproducing machines, a horn compartment, a horn therein a rail therein, means for carrying said horn upon said rail, means for guiding said horn in the direction of said rail, a machine compartment with an entrance for said horn in the wall thereof and a flexible partition surrounding said horn entrance and separating said compartments.

3. In a cabinet for sound reproducing machines, a horn compartment, a movable horn therein means for suspending said horn therein, a machine compartment, and a conical flexible partition snugly fitting about said horn and separating said aforementioned compartments.

4. In a cabinet for sound reproducing machines, a horn compartment, a horn therein an inclined rail therein, means for carrying said horn thereon, a flexible partition through which said horn is adapted to extend, doors for the escape of sound therefrom, a machine compartment on the other side of said flexible partition, a door thereto, and means for opening the doors for the escape of the sound located at said last mentioned door.

5. A cabinet for sound reproducing machines comprising a compartment, a movable horn therein, means for suspending said movable horn therein, a sound reproducing machine compartment located at one end of said first mentioned compartment, a flexible

partition between said compartments having an opening for said horn therein, and means operable from the outside of said machine compartment for starting and stopping a machine contained therein.

5 6. A cabinet for sound reproducing machines, comprising a compartment, a longitudinally movable horn therein, an adjustable supporting rail attached to the top of  
10 said compartment for supporting the amplifying horn in its longitudinal movement, another compartment having means for holding said horn disengaged when the sound reproducing machine is inoperative, said  
15 means guiding said horn in its movement in coöperation with said rail, when said sound reproducing machine is in operation.

7. In a cabinet for sound reproducing machines, having horizontal and longitudinal space for a horn and a sound reproducing machine, an inclinable supporting and guiding rail, suspended from the top of said cabinet above said horn space, another guide rail attached to the top of said cabinet above said machine space, and a horn suspended  
20 from one of said rails, and having one end guided by the other of said rails.

In testimony whereof, I have hereunto set my hand in the presence of two witnesses.

HELGE A. BORRESEN.

Witnesses:

E. M. PATTERSON,  
BENJ. T. ROODHOUSE.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."







A. L. MAILLARD & L. H. CROOK.

SIGNAL.

APPLICATION FILED FEB. 7, 1913.

Patented Sept. 8, 1914.

2 SHEETS—SHEET 1.

1,109,684.

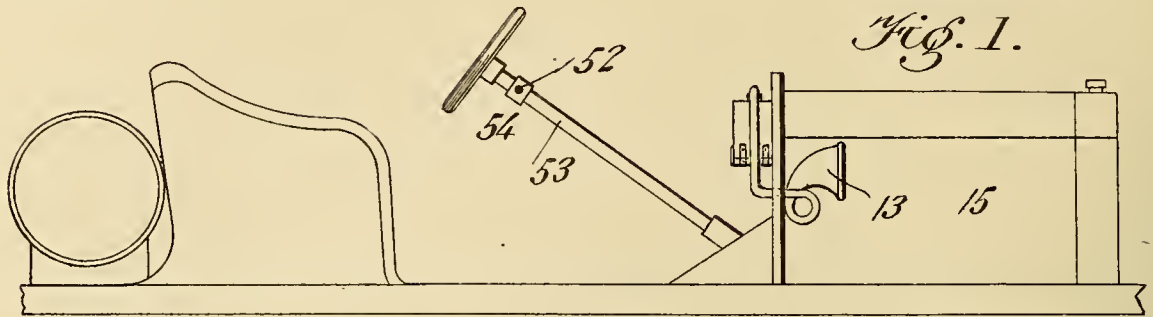


Fig. 2.

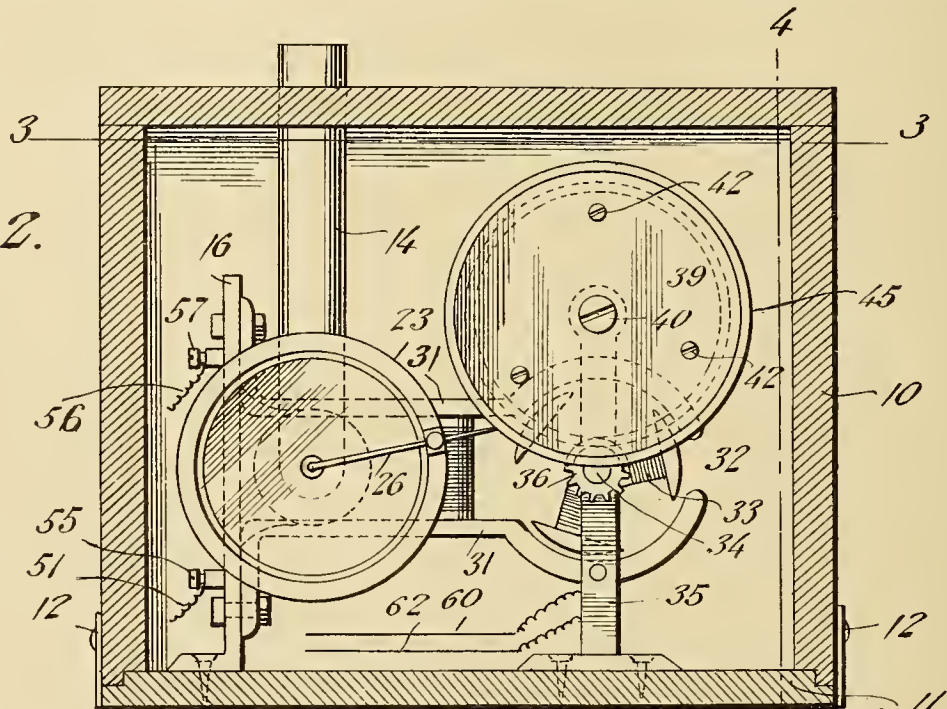
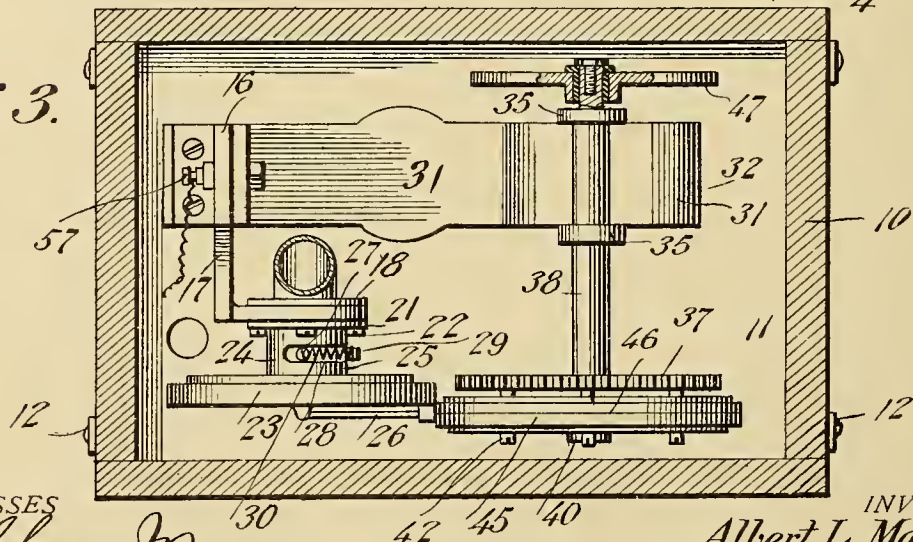


Fig. 3.



WITNESSES  
*W. Ackman Jr.*  
*Frances C. McRae.*

INVENTORS  
*Albert L. Maillard*  
*Louis H. Crook*  
*G. H. Hoster* Attorney





A. L. MAILLARD & L. H. CROOK.

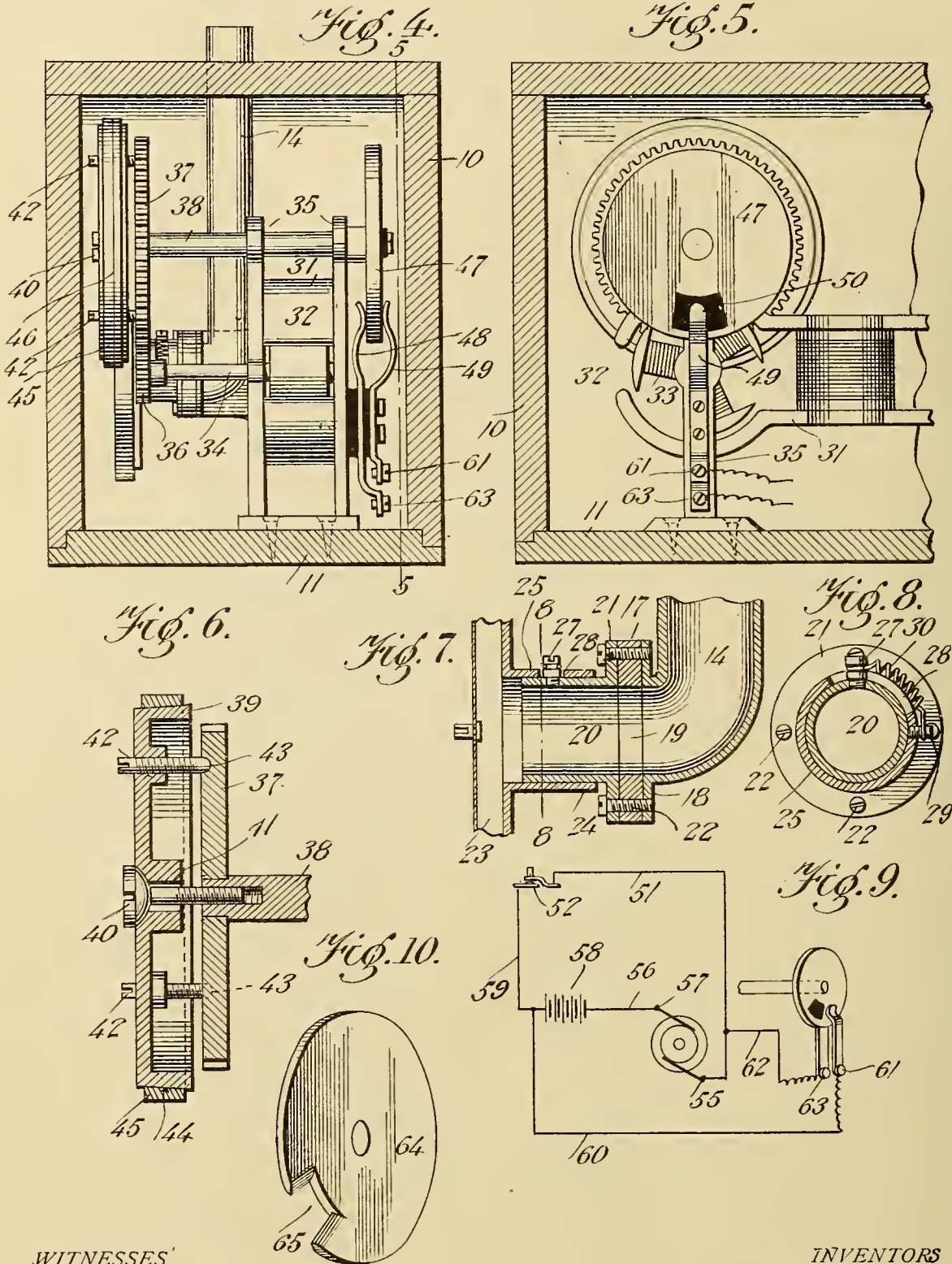
SIGNAL.

APPLICATION FILED FEB. 7, 1913.

Patented Sept. 8, 1914.

2 SHEETS-SHEET 2.

1,109,684.



WITNESSES  
*J. H. Adams Jr.*  
*Frances C. McDade.*

INVENTORS  
*Albert L. Maillard*  
*Louis H. Crook*  
*P. A. Hoster* Attorney



# UNITED STATES PATENT OFFICE.

ALBERT L. MAILLARD AND LOUIS H. CROOK, OF WASHINGTON, DISTRICT OF COLUMBIA.

## SIGNAL.

1,109,684.

Specification of Letters Patent.

Patented Sept. 8, 1914.

Application filed February 7, 1913. Serial No. 746,841.

*To all whom it may concern:*

Be it known that we, ALBERT L. MAILLARD, a subject of the King of Great Britain, and LOUIS H. CROOK, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Signals, of which the following is a specification.

The invention relates to signals and more particularly to that class of signals known as alarms and has for an object to provide a signal for producing the sounds of instruments and the like or for reproducing the voice.

The invention embodies, more particularly, a signal adapted for use on vehicles such as automobiles and the like or on motor boats and ships and wherein it is desired to provide a means whereby the voice or voices of a human being or beings can be reproduced to act as a signal, the device being also adapted for use in producing musical or other sounds.

The invention further embodies a device in which use is made of a record adapted to contain a wave line and similar in many respects to the usual phonograph record, the device being preferably electrically operated whereby, when the record is rotated, a stylus carried by a reproducer operates over the wave line to produce the desired sound.

In the further disclosure of the invention reference is to be had to the accompanying drawings, constituting a part of this specification, in which similar characters of reference denote corresponding parts in all the views, and in which:

Figure 1 is a fragmentary side elevation of a vehicle having our device attached thereto; Fig. 2 is a vertical sectional view of the casing in which the signal is arranged, showing the various parts of the signal in side elevation; Fig. 3 is a horizontal sectional view of the casing, taken on the line 3—3 in Fig. 2, showing the various parts of the signal in plan; Fig. 4 is a vertical transverse sectional view of the casing, taken substantially on the line 4—4 in Fig. 2; Fig. 5 is a fragmentary vertical sectional view taken on the line 5—5 in Fig. 4; Fig. 6 is a fragmentary enlarged vertical sectional view of the drum, showing the record supported thereon; Fig. 7 is a fragmentary enlarged vertical sectional view, showing the manner of supporting the reproducer in po-

sition to convey sounds through the horn; Fig. 8 is a vertical transverse sectional view, taken on the line 8—8 in Fig. 7; Fig. 9 is a diagrammatic view, showing the electrical connection for the device; and Fig. 10 is a perspective view of a modified form of circuit closing member.

Referring to the views, we provide a casing 10 having the bottom thereof open and adapted to normally repose on a base 11 substantially rectangular in shape, suitable locking members 12 being supported on the lower end of the casing 10 and adapted to engage the base 11 to lock the casing 10 on the said base.

A horn 13 terminating in a reduced tubular stem 14 is adapted to be supported on a vehicle 15 disclosed in Fig. 1 and the tubular stem 14 of the horn 13 depends within the casing 10, as shown in Figs. 2 and 4. Secured to the base 11 is an upright 16 supporting a horizontal L-shaped bracket 17, and the lower end of the tubular stem 14 terminates in a circular flange 18 abutting against the bracket 17 and which is provided with an opening 19 registering with the opening to the lower end of the stem. A tubular supporting member 20 is provided with an integral circular flange 21 abutting against the other side of the bracket 17, with the opening to the tubular supporting member registering with the opening 19 in the bracket 17, suitable screws 22 being passed transversely through the flange 18, the bracket 17 and the flange 21 to rigidly connect the lower end of the tubular stem 14 to the bracket and rigidly support the member 20 on the bracket.

A phonograph reproducer 23 of any preferred type and including a casing 24 provided with a lateral sleeve 25 and supporting a stylus 26 is adapted to turn on the supporting member 20 without, however, having any longitudinal movement on the supporting member, and in order to accomplish this result, the reproducer 23 is first engaged with the supporting member 20 by having the sleeve 25 encircle the tubular portion of the supporting member, after which a screw 27 is passed transversely through a slot 28 formed in the sleeve 25, with the inner end of the screw extending into the tubular portion of the supporting member 20, thus rotatably supporting the reproducer 23 on the supporting member, while at the same time



the reproducer will be prevented from moving longitudinally thereon by the screw 27 passing through the mentioned slot 28 in the sleeve 25 of the reproducer. A screw 29 is

carried on the sleeve 25 of the reproducer and a contractile helical spring 30 has the ends thereof secured to the screws 27 and 29, as shown in Fig. 8, and for a purpose that will be hereinafter more fully disclosed.

Projecting forwardly and horizontally from the upright 16 are a plurality of brackets 31 constituting the field of a motor 32 including an armature 33 carried by a shaft 34 journaled in vertical uprights 35 secured to the base 11 and projecting upwardly on both sides of the free end of the brackets 31. An end of the shaft 34 projects beyond one of the uprights 35 and keyed on the said end of the shaft is a toothed wheel 36 meshing with a toothed wheel 37 carried on a horizontal shaft 38 journaled in the upper end of the uprights 35. A drum 39 is adapted to be adjustably supported on the body of the toothed wheel 37 and in order to accomplish this result a headed screw 40 is passed loosely through a central opening 41 in the drum 39 and has threaded connection with the shaft 38 carrying the toothed wheel 37, the opening 41 being of a sufficiently greater diameter than the diameter of the screw 40 so that the drum 39 will be loosely supported. Now in order to provide for an adjustment of the disk with respect to the toothed wheel 37 and the shaft 38, a series of set screws 42 have threaded connection with the drum 39 and pass transversely therethrough, with the inner ends of the said screws extending into recesses 43 formed in the body of the toothed wheel 37. We preferably employ three of these adjusting screws 42, and it will be apparent that in this manner the drum 39 can be readily adjusted so as to rotate truly with the shaft 38. The periphery 44 of the drum 39 is preferably tapered and adapted to receive and support a cylinder record 45, as shown in Fig. 6, the said record having the usual wave line 46 and which, in this instance, is a single continuous line extending entirely around the record. Now referring to Figs. 2 and 3 it will be seen that the contractile action of the spring 30 holds the pointed end of the stylus 25, carried by the reproducer 23, against the record 45, the said spring being adapted to at all times exert an upward pull on the stylus and tend to rotate the reproducer toward the left so that the stylus will normally be held in engagement with the record. Now by providing the adjustment of the drum 39 with respect to the disk-like toothed wheel 37 and shaft 38 carrying the drum, the record 45 will be supported on the drum in a manner which will permit of readily alining the stylus 25 with the wave line 46 so that when the drum 39 is rotated the stylus will operate in the wave line 46 of the record 45, and although the wave line on the record is very fine and a single continuous line, by providing the adjustment of the drum 39 as mentioned heretofore, it will be apparent that an adjustment of the record with respect to the stylus can be easily obtained so that the pointed end of the stylus will operate in the wave line of the drum at all times. Rigidly carried on the other end of the horizontal shaft 38 and insulated therefrom, as shown in Fig. 3, is a circular circuit closing member 47 and rigidly secured on one of the uprights 35 and insulated therefrom is a brush 48 having the upper end thereof engaging the inner face of the circuit closing member 47, a similar brush 49 being supported on the same upright 35 and insulated from the upright and from the brush 48, with the upper end of the brush 49 engaging the outer face of the circuit closing member 47. Now referring to Fig. 5 it will be seen that the circuit closing member 47 is provided with a circuit breaking member 50, which may consist of a segmental piece of mica secured to the outer face of the circuit closing member or the said member may be formed on the circuit closing member in any other convenient manner, it being further apparent by referring to Figs. 4 and 5 that the outer brush 49 passes over the member 50 when the said member 47 is rotated.

Now referring to Figs. 1 and 9 it will be seen that a wire 51 extends from a switch 52, in this instance carried on the stem 53 of a steering wheel 54 of the vehicle 15, to a binding post 55 having connection with the field of the motor 32, a second wire 56 having connection with a binding post 57 of the motor 32 and with a set of batteries 58 preferably located in any convenient place on the vehicle 15. A wire 59 connects the batteries 58 with the switch 52, and a wire 60 has connection with the wire 59 adjacent the batteries 58 and is arranged for connection with a binding post 61 of the outer brush 49, while still another wire 62 connects the wire 51 with a binding post 63 carried by the brush 48.

Before proceeding to a detailed description of the operation of the device, it will be understood that the wave line 46 represents, for instance, a vocal expression or reproduction of the sound of a musical instrument so that when the record 45 is swiftly rotated, the stylus 26 of the reproducer 23, operating over the wave line of the record, will, through the medium of the phonographic reproducer, produce a sound which will be emitted from the large end of the horn 13 and which will be an actual expression of the wave line on the record. Now when the device is in initial position, it should be remembered that if, for instance, the expression "Please get out of the way" is used,



the stylus 26 will lie on the wave line 46 at a point immediately preceding the waves which are to produce the first word of the expression, and when the stylus is in this position the brush 49 will engage and lie against the member 50 of the circuit closing member 47 carried on the shaft 38. Now when it is desired to produce the expression and have the same emitted from the large end of the horn 13 as a signal or alarm, the switch 52 is closed, thus completing the circuit from the switch to the batteries and the motor 32 so that the motor will be operated and rotation imparted to the shaft 34. Now as the shaft rotates the toothed wheel 36 will be rotated and, through the medium of the toothed wheel 37, will impart rotation to the shaft 38, thus rotating the drum 39 carrying the cylinder record 45 and also rotating the circuit closing member 47. In the initial rotation of the said member 47 it will be plainly seen by referring to Fig. 5, that the member 50, rotating with the circuit closing member, will pass beyond the brush 49 so that the brush will engage the outer face of the circuit closing member and at the moment that the brush engages the outer face another electrical circuit will be closed between the motor 32, the batteries 58 and the circuit closing member 47 so that if the switch 52 is released at this moment the shaft 38 will continue to revolve in view of the second circuit being closed, as mentioned. It will, therefore, be apparent that the object in providing the two electrical circuits is to initially rotate the circuit closing member 47 when the switch 52 is closed, while the provision of the second circuit will result in the continued rotation of the circuit closing member 47 after the switch 52 has been released and normally returns to an open or broken position. Now at the moment the circuit breaking member 50 of the member 47 passes beyond the brush 49, the brush 49, as well as the brush 48, will engage the outer and inner faces respectively of the circuit closing member 47, thus resulting in the continued rotation of the said member and the continued rotation of the drum 39 so that the pointed end of the stylus 26 of the reproducer 23, operating over the wave line of the cylinder record, will produce the desired expression without necessitating the operator retaining his hand on the switch 52. At the moment the expression has been emitted from the large end of the horn 13, and the last sound of the expression has been completed, the drum 39 will have made a complete revolution and in consequence thereof the circuit closing member 47 having made a complete revolution, the circuit breaking member 50 will again be brought into engagement with the brush 49, thus breaking the second electrical circuit and resulting in the discontinuance of the rotation

of the drum 39 and circuit closing member. It will now be apparent that the entire device is again at its initial position and in order to again produce the expression it is only necessary to close the switch 52 to initially rotate the member 47, after which, when the switch is released to break the first electrical circuit, the circuit breaking member 47 will continue its rotation, thus rotating the drum 39 and the cylinder record 45 so that the expression will be again repeated through the medium of the reproducer 23 and the stylus 26 thereof, operating over the wave line 46 on the cylinder record. Therefore, each time that the switch 52, carried by the steering mechanism of the vehicle is closed, the expression "Please get out of the way," or any other sound or expression which it may be desired to reproduce with the particular record, will be emitted from the horn 13 to act as an alarm or signal to a pedestrian standing or passing in front of the vehicle as it advances along the highway.

In Fig. 10 we disclose a modified form of circuit closing member and in which, in place of the circuit closing member 47, we provide a circular disk 64 similar to the member 47 and carried on the same shaft 38 thereof but adapted to take the place of the member 47 on the machine described, the said disk having a cut away portion 65 constituting a circuit breaking portion and adapted to perform the same function as the circuit breaking member 50 of the circuit closing member 47. It will therefore be readily apparent that whether the circuit closing member 47 is employed or whether the circuit closing member disclosed in Fig. 10 is employed in connection with the machine, each of the said circuit closing members will embody a circuit breaking portion adapted to break the second electrical circuit in order that the phonographic record 45 will resume a stationary position after making one complete revolution.

From the foregoing description it will therefore be seen that we provide a simple device, compact in form and easily operable to produce an alarm and it should be particularly noted that in the device described neither the reproducer 23 or the drum 39 and record 45 are capable of a longitudinal movement when the device is in operation, the reproducer being simply adapted to turn and the drum and record to rotate. By providing the adjustment of the drum described heretofore, the cylinder record can be so arranged upon the drum and with respect to the point of the needle that the needle will not deviate from the wave line of the record when rotation is imparted to the record. Therefore, with a device of the character described it is only necessary to close the switch 52 for a mo-



ment in order to produce the desired result, this being accomplished through the medium of two electrical circuits, one of which constitutes an initial circuit for initially rotating the record and the other of which constitutes a final circuit for continuing the rotation of the record to result in a complete revolution of the record so that the needle of the reproducer will operate over the entire continuous wave line of the record.

As mentioned heretofore, the record may be constructed for the purpose of reproducing the voices of human beings, bells, whistles, chimes or any other sounds, which may be deemed appropriate as an alarm or signal, particularly when the device is used on vehicles such as automobiles and the like.

Having thus described our invention, we claim:

1. In a signal, the combination, of a support, a shaft journaled thereon, a drum carried by the shaft for supporting a record tablet, a reproducer including a stylus operable over the said drum, a member carried on the shaft and in juxtaposition to the said drum, and a plurality of means operable on the drum and engaging the member for adjusting the said drum relatively to the said stylus.

2. In a signal, the combination, of a support, a shaft journaled thereon, a drum carried by the shaft for supporting a record tablet, a reproducer including a stylus operable over the said drum, a toothed wheel carried by the shaft, a motor, means connecting the motor with the toothed wheel to impart rotation to the drum, and means carried by the drum and engaging the toothed wheel for adjusting the said drum relatively to the said stylus.

3. In a signal, the combination, of a support, a shaft journaled thereon, a drum carried by the shaft for supporting a record tablet, a reproducer including a stylus operable over the said drum, a toothed wheel carried by the shaft, a motor, means con-

necting the motor with the toothed wheel to impart rotation to the drum, and a series of set screws adjustably carried on the drum and engaging the toothed wheel for varying the position of the drum relatively to the said toothed wheel.

4. In a signal, the combination, of a support, a shaft journaled thereon, a drum carried by the shaft for supporting a record tablet, a reproducer including a stylus operable over the said drum, a toothed wheel carried by the shaft, a motor, means connecting the motor with the toothed wheel to impart rotation to the drum, a series of set screws adjustably carried on the drum and engaging the toothed wheel for varying the position of the drum relatively to the said toothed wheel, and means centrally arranged on the drum and having connection with the shaft for varying the space between the said drum and the said shaft.

5. In a signal, the combination of a drum for supporting a record tablet, a reproducer including a stylus operable over the drum, a revoluble member supporting the drum, and means connecting the revoluble member with the drum for adjusting the drum in a plurality of planes at an angle to each other and to the said stylus.

6. In a signal, the combination of a record tablet supporting drum, a reproducer including a stylus operable over the drum, a revoluble member having the drum supported on one side thereof, means for adjusting the drum in a plane at right angles to the vertical plane of the stylus and the plane of the said revoluble member, and means for adjusting the drum in a direction at an angle to the plane of the first mentioned adjustment.

In testimony whereof we affix our signatures in presence of two witnesses.

ALBERT L. MAILLARD.

LOUIS H. CROOK.

Witnesses:

JAMES A. KOEHL,

GEO. ACKMAN, Jr.





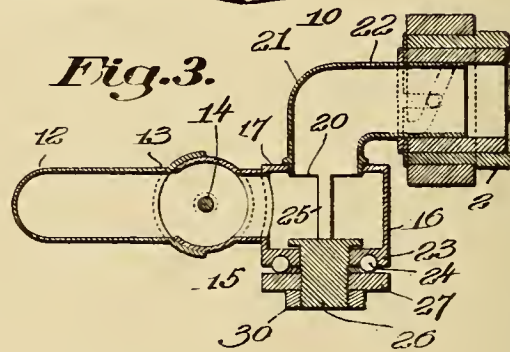
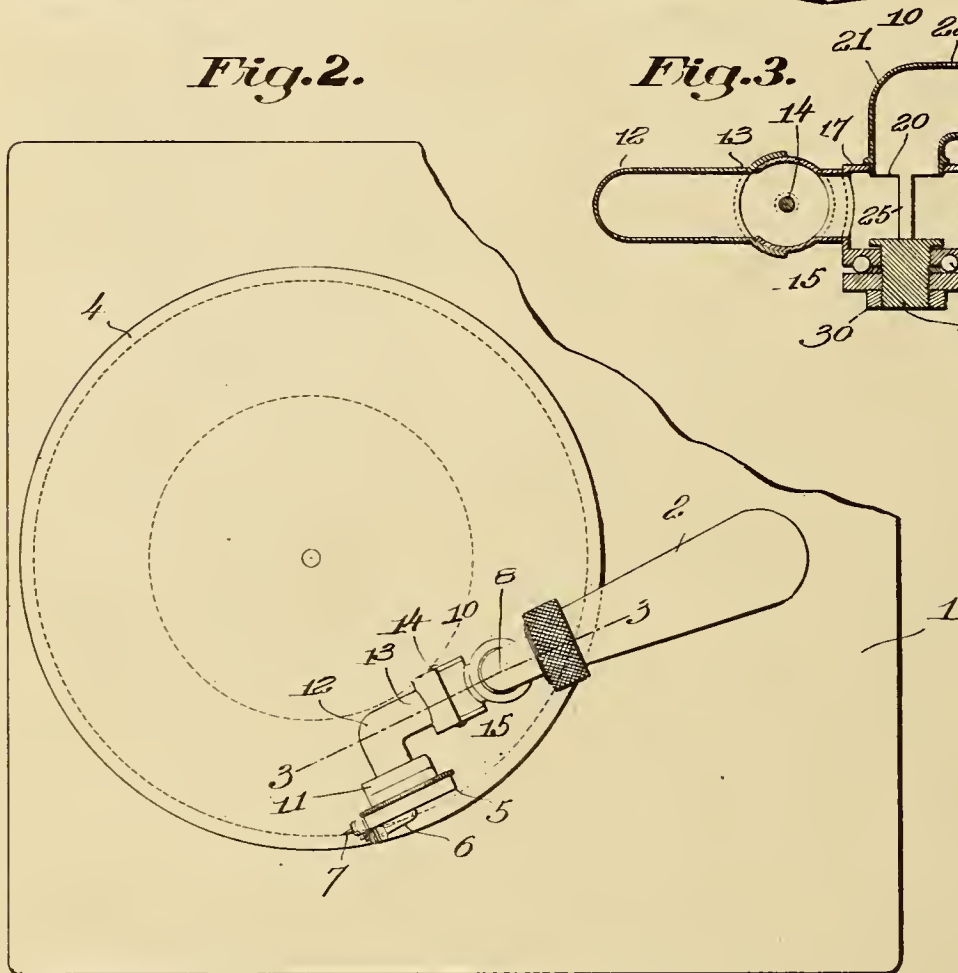
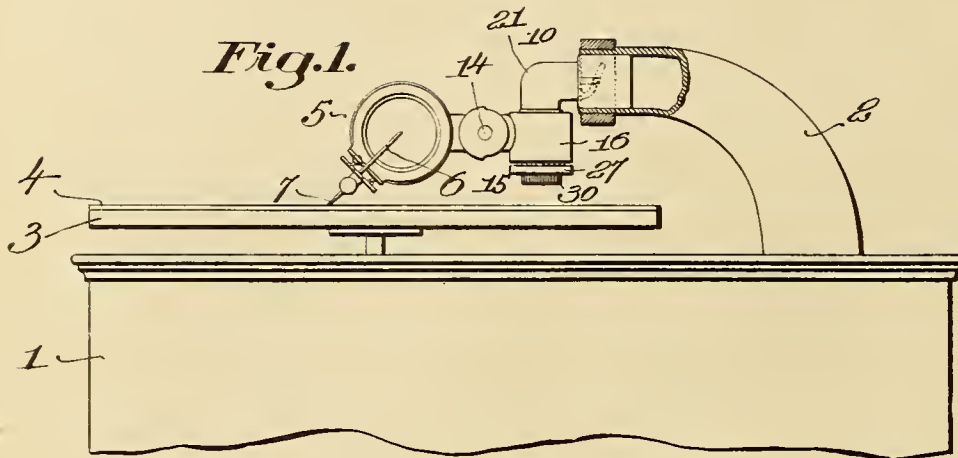
C. P. TRUNDY.

PHONOGRAPH.

APPLICATION FILED DEC. 10, 1913.

1,110,165.

Patented Sept. 8, 1914.



**Witnesses**  
*Frederick S. Graubaf*  
*Alice Ackroyd*

**Inventor**  
*Charles P. Trundy*  
*by his attorneys*  
*Phillips, Watson & Fish*

# UNITED STATES PATENT OFFICE.

CHARLES P. TRUNDY, OF BOSTON, MASSACHUSETTS.

## PHONOGRAPH.

1,110,165.

Specification of Letters Patent.

Patented Sept. 8, 1914.

Application filed December 10, 1913. Serial No. 805,736.

*To all whom it may concern:*

Be it known that I, CHARLES P. TRUNDY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improvement in phonographs. In machines adapted for reproducing sounds from hill-and-dale cut records, the sound box is rigidly supported on the end of the tone tube which is fed laterally across the record as the needle point travels along the record groove. The spacing of the grooves is not always uniform with the feed of the tone tube, and provision is made for inequalities between the feed demanded by the record groove and the feed of the tone tube, by mounting the needle upon the sound box in such a way as to permit slight movements of the needle support with respect to the tone tube in order that the needle may correctly adapt itself to the sound groove. Machines of the hill-and-dale type impart vertical vibrations to the reproducing needle and they are not, therefore, adapted to reproduce sounds from lateral cut records in which the sound vibrations are represented by lateral undulations of the sound groove. These records impart lateral vibrations to the needle point and the needle arm transmits these vibrations to the diaphragm which is mounted in position to receive the lateral vibrations imparted to it by the record through the medium of the needle and needle arm. In order to adapt the hill-and-dale machine to reproduce sounds from lateral cut records, it is necessary that it be provided with a lateral cut record sound box and a flexible connection between such sound box and the tone tube.

The object of the present invention is to produce a connection tube for hill-and-dale phonographs for connecting the sound box to the tone tube so as to adapt it to use lateral cut records.

To the above end the present invention

consists in the tube hereinafter described and particularly defined in the claims.

In the accompanying drawings Figure 1 is a side elevation of a portion of a hill-and-dale machine provided with the connection tube of the present invention; Fig. 2 is a plan of such machine; and Fig. 3 is a longitudinal section of the connecting tube between the tone tube and the sound box taken on the line 3—3, Fig. 2.

The illustrated embodiment of the invention is described as follows:—The cabinet 1 incloses the motor and the horn. The tone tube 2 extends from the horn up over the turn table or record carrying plate 3 upon which the record disk 4 is supported, in the usual manner. A lateral cut record sound box 5 carries the sound diaphragm and the needle arm 6 in which the needle 7 is supported in the usual manner. The connection between the sound box and the tone tube forms the subject of this invention. This connection consists of a tube provided with two joints, one having a horizontal axis and the other a vertical axis, the former permitting the sound box to adapt itself to the height and the inequalities of the record and the latter permitting the sound box to follow the sound groove as the record is rotated by swinging the sound box and its supporting tube about such vertical axis joint. This tube connecting the sound box and tone tube is called a connection tube, and is indicated in a general way with the reference character 10. The connection tube at its extreme end has provision for receiving and supporting and holding the sound box in position thereon. The sound box carrying the portion indicated by the reference character 11, is supported on one arm of the elbow 12, the plane of which is parallel to the plane of the disk record 4. The near end 13 of the elbow 12 is jointed on a horizontal axis at 14, that is, an axis parallel to the surface of the disk record 4, to the double joint section 15. The axis of the joint 14 being horizontal, the sound box 5 is permitted to adapt itself to the surface of the record holding the needle 7 in the groove of the record by the weight of the sound box, as is the practice in lateral cut record machines. The joint 14 affords a



free sound passage, as shown in Fig. 3, the pintle of the joint being the only thing in the path of the sound waves and the joint being enlarged somewhat beyond the size of the tube so as to afford a full area passage for the sound waves. At the near end of the double joint section 15, the section is provided with a cylindrical enlargement 16, the axis of which is vertical. The upper base 17 is perforated in the center of the cylindrical enlargement 16 and receives therethrough the extreme end, 20 of the elbow 21 of the tube 10, the other arm 22 of which elbow is received in the tone tube 2. The lower base 23 of the cylindrical enlargement 16 is grooved, and in the groove are located a number of balls 24. The end 20 of the elbow 21 is connected by means of a cage or transversely apertured portion 25 with the stud 26 which passes through a central opening in the lower base 23 of the cylindrical enlargement 16. A bearing ring 27 embraces the stud 26 and engages the lower surface of the balls 24, so the lower disk 23, balls 24 and the ring 27 constitute a ball bearing for the vertical joint of the connecting tube 10. The stud 26 is screw-threaded and the nut 30 holds the bearing ring 27 in position. By adjusting the nut 30 the bearing may be adjusted to a nice fit. The cage 25 consists simply of two bars connecting the end of the arm 20 of the elbow 21 with the stud 26. This cage, therefore, obstructs the vibration passage through the vertical axis joint very slightly, and a clear, free passage is provided for the sound waves to pass from the sound box to the tone tube.

By reference to Fig. 2, it will be seen that the vertical axis joint 8 affords provision for the lateral movement of the sound box across the face of the record, and that the horizontal axis joint 14 affords provision for lifting the sound box for the insertion of new needles and for the purpose of removing it from the record and applying it thereto. It is to be observed that with the present construction of connecting tube it is not necessary that the tone tube should be fed across the record, as the vertical axis joint 8 will afford sufficient amplitude of movement of the sound box and the needle across the record without the feeding movement being imparted to the tone tube.

It is of importance that the vertical axis joint 8 should be one permitting extremely free movement of the sound box laterally across the record disk, and while it is preferred to use a ball bearing in this joint it is within the purview of the invention to use any low-friction joint. The horizontal axis joint 14 should be one permitting comparatively free vertical movement of the sound box carried thereby, but inasmuch as the weight of the sound box is considerable, it will hold itself

in contact with the record with the requisite pressure without requiring the horizontal axis joint to be made of extreme low-friction form, whereas with the vertical axis joint the action of gravity has no effect upon the movement of the parts carried thereby, and being required to be actuated simply by the sound groove of the record, it is imperative that it should be of low-friction form.

This invention is of great practical importance as it enables the possessor of a hill-and-dale machine to play lateral cut records on it.

One of the features of this invention which contributes to the successful performance of its intended function resides in locating the vertical axis joint at such a distance from the needle point and providing it with such a low-friction bearing that the sound groove of the record disk will be sufficient to swing the connecting tube on the vertical axis joint without undue wear on the sound groove. Another feature of importance consists in locating the horizontal axis joint 14 between the vertical axis joint and the sound box in such a position that the sound box will bear with proper pressure upon the record so as thereby to cause the record to efficiently actuate the needle.

The present invention is not limited to the illustrated embodiment thereof, as it may be embodied in other forms within the scope of the invention as defined in the following claims.

I claim—

1. A connection tube for a hill-and-dale phonograph having one end adapted to be connected with the tone tube and the other end adapted to be connected with the sound box, said tube having an elbow located in a vertical plane at one end and an elbow located in a plane at right angles thereto at the other end and intermediate means whereby said sound box is permitted to have free movement during reproduction, substantially as described.

2. A connection tube for hill-and-dale phonographs having a vertical plane elbow at the tone tube end, a horizontal plane elbow at the sound box end, a vertical axis joint near the tone tube end and a horizontal axis joint between the vertical axis joint and the sound box, substantially as described.

3. A connection tube for hill-and-dale phonographs having one end adapted to be connected to the tone tube, the other end adapted to be connected to a sound box, said tube being provided with a vertical axis joint near its tone tube end with a ball bearing support for the connection tube associated therewith and with a horizontal axis joint between the vertical axis joint and the sound box, substantially as described.

4. A connection tube for hill-and-dale

70

75

80

85

90

95

100

105

110

115

120

125

130

phonographs having one end adapted to be connected to the tone tube, the other end adapted to carry the sound box provided with a vertical axis low-friction joint near the tone tube end, said vertical axis joint comprising an enlargement on one portion of the tube and a transversely apertured member on the other portion of the tube received in said enlargement so as to permit the free passage of sound waves there- 10 through without material obstruction, substantially as described.

CHARLES P. TRUNDY.

Witnesses:

HORACE VAN EVEREN,  
GEO. E. STEBBINS.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



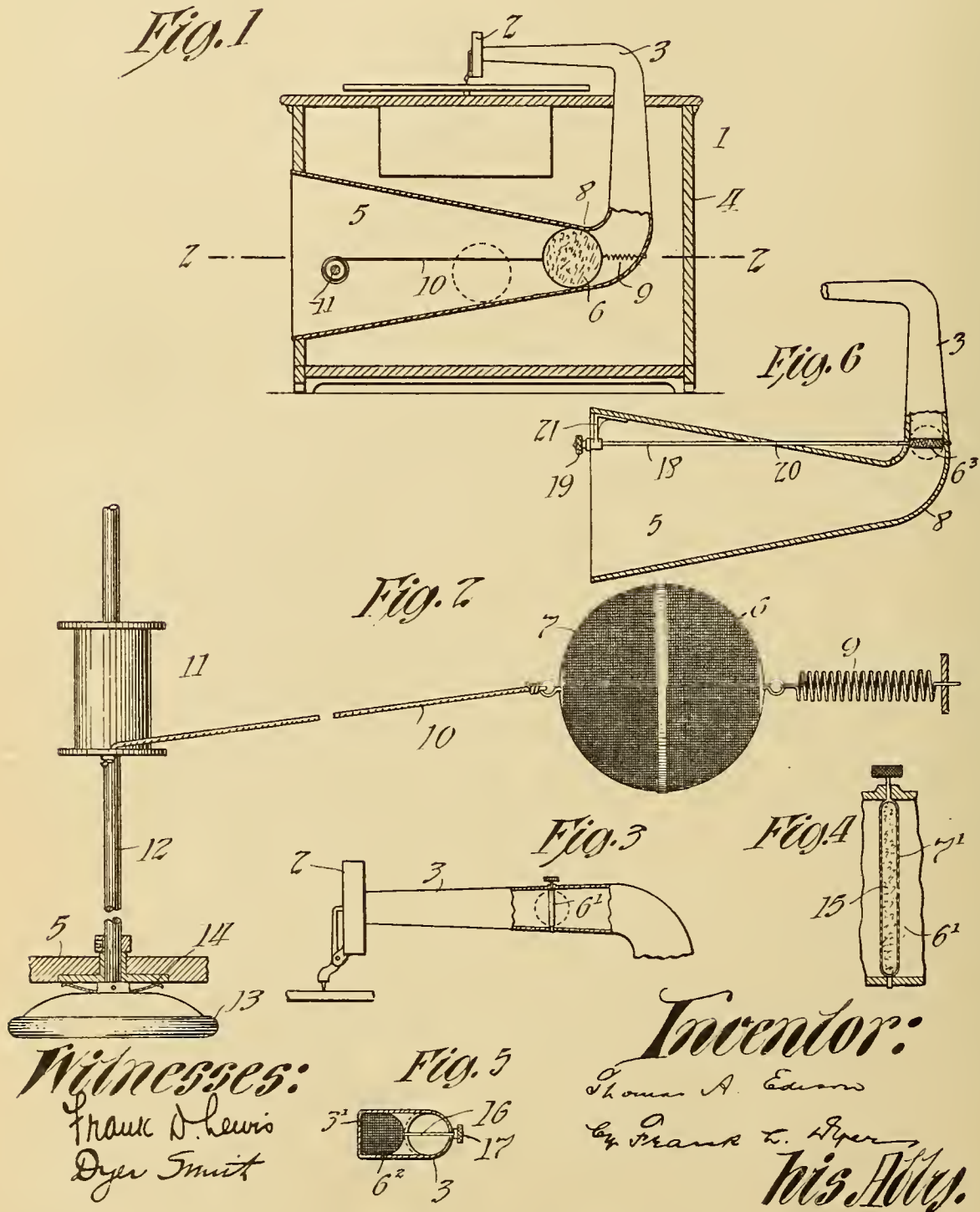




T. A. EDISON.  
SOUND MODIFIER.  
APPLICATION FILED DEC. 9, 1910.

1,110,382.

Patented Sept. 15, 1914



# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-MODIFIER.

1,110,382.

Specification of Letters Patent.

Patented Sept. 15, 1914.

Application filed December 9, 1910. Serial No. 596,536.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Sound-Modifiers, of which the following is a description.

My invention relates to devices for modifying or varying the volume or loudness of sound produced by a phonograph or talking machine. Such devices as commonly used comprise a metallic part, such as a butterfly valve, located at some point in the sound conveyer, which valve is opened to a greater or less extent to vary the area of cross section of the conveyer through which the sound reproduced passes. Such a device is objectionable because of the sharp angular deflection of the sound from the metallic surface. I have determined that a sound modifier should be of such nature as to permit the sound vibrations to pass through the same without deflection even when the modifier is in closed position, the intensity or amplitude of the vibrations being, however, lessened by their passage through the modifier.

One of the objects of my invention, accordingly, is to produce an efficient and serviceable device of this character.

Other objects of my invention reside in the details of construction and combinations of parts more particularly pointed out in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a vertical central section through a talking machine provided with a modifier embodying my invention, certain parts being shown in side elevation; Fig. 2 represents on an enlarged scale partly broken away of a cross section on line 2—2 of Fig. 1; Fig. 3 is a fragmentary view showing in side elevation and section a portion of a sound conveyer provided with a modification of my sound modifier; Fig. 4 is a detail sectional view showing the sound modifier of Fig. 3 on an enlarged scale; Fig. 5 represents in section another modifi-

cation of my device adapted to be used in place of the modifier shown in Figs. 3 and 4; and Fig. 6 represents a partial section through a sound conveyer similar to that shown in Fig. 1, provided with a sound modifier similar to that illustrated in Figs. 3 and 4.

Referring to the drawings, the talking machine 1 comprises the reproducer 2 and the sound conveyer 3 carrying the same, which sound conveyer, as illustrated, has a portion rearwardly directed from the reproducer thence downwardly into the cabinet 4, and thence forwardly in the sound amplifying exit portion of the conveyer 5. It is, however, obvious that my improved sound modifier may be applied to the sound conveying passages of any other form of talking machine.

In the preferred form of my device, the sound modifier consists of a sphere 6 which preferably consists of a spherical container 7 within which is inclosed a loosely packed mass of cotton waste or horsehair, asbestos, cloth, or other cellular or fibrous material. The inclosing case is preferably of wire gauze. As shown in Figs. 1 and 2, modifier 6 is positioned within the large amplifying portion 5 of conveyer 3 and may completely fill the same at a point adjacent the bend or elbow 8 of the conveyer, or may be moved to the left as shown, for example, in dotted lines in Fig. 1, to a position in which it does not fill the sound passage. The modifier 6 is preferably moved into adjusted position and there held by the means illustrated, consisting of a spiral spring 9 secured to the rear side of the modifier 6, the other end of the spring being secured to the inside of the bend 8 of the conveyer. The forward side of the modifier has secured thereto a cord 10 which is adapted to be wound upon a bobbin 11 mounted upon a stem 12 which extends out through the wall of amplifier 5 and is provided on the exterior thereof with a knob 13 for turning the same. A spring 14 which is stronger than spring 9 may be interposed between knob 13 and the surface of amplifier 5 to hold the hobbin and sound modifier by friction in any adjusted position. When it is desired to move the modifier to the left, as shown in Fig. 1, knob 13 is turned in such a direction as to wind



the cord 10 upon the bobbin 11. When it is desired to move the modifier to the right to restrict or close the air passage, the knob 12 is turned in the opposite direction to un-

5 wind the cord 10 from the bobbin.

When the modifier is in the position shown in full lines in Fig. 1, it completely fills the opening and the volume of sound produced by the machine will be a minimum, the volume increasing as the modifier is moved to the left allowing a certain amount of the sound to pass through the amplifier 5 without contacting the modifier. The amplifier 5 is preferably of a progressively in-

10 creasing diameter as shown. When the modifier is in the position shown in full lines, the sound vibrations traveling through conveyer 3 pass through the same without deflection, but with their amplitude or in-

20 tensity reduced so that the loudness of the sound reproduced is decreased. By forming the modifier as a sphere, the sound vibrations in the central portion of the conveyer will have a longer path through the modi-

25 fier than those near the sides of the conveyer, and will, accordingly, be reduced in amplitude to a greater extent by the modifier. The energy of the vibrations adjacent to the sides of the conveyer, however, is dis-

30 sipated to some degree by friction with the walls of the conveyer, so that the spherical modifier tends to equalize the intensity of the vibrations throughout the conveyer.

While I prefer to inclose the material of the modifier in a wire gauze container, it is not essential, although it is preferable because of its strength and durability. In place of the wire gauze a covering of silk or other material which would permit the pas-

40 sage of sound vibrations therethrough might be used.

In Figs. 3 and 4 I have illustrated another form of sound modifier consisting of the butterfly valve 6', which may be located in the horizontal arm of the sound conveyer 3. As illustrated, this form of modifier comprises a hollow disk-like container 7' preferably of wire gauze, the interior of the container being filled, as in the first form of my invention, with cotton waste, horsehair, or similar material 15. This valve may be placed in the position illustrated by full lines in Fig. 3, in which all the sound vibrations must pass therethrough, or may be rotated toward the position at right angles thereto, as illustrated by dotted lines in Fig. 3, in which practically none of the sound vibrations pass therethrough.

Another modified form of my device is illustrated in Fig. 5, in which the device is illustrated as a sliding valve 6<sup>2</sup>. This valve is preferably formed of a wire mesh container with the fibrous or cellular material contained therein, as in the other forms of

65 my invention. This valve may have a stem

16 attached thereto, stem 16 having a head or thumb piece 17 upon the end thereof outside the conveyer, whereby the same may be moved to cover to a greater or less extent the opening of the sound conveyer 3, as shown. The guide 3' for the slide valve may be positioned at any convenient point in conveyer 3.

In Fig. 6 I have illustrated a sound modifier 6<sup>3</sup> in all respects similar to the butterfly valve 6' illustrated in Figs. 3 and 4, mounted preferably just above the bend 8 in conveyer 3. Valve 6<sup>3</sup> has secured thereto or integral therewith the stem 18 extending forwardly in a horizontal direction and provided on its forward end, in a convenient position in front of the mouth of amplifier 5, with the head or thumb piece 19, by which modifier 6<sup>3</sup> may be rotated as described in connection with Fig. 3. Stem 18 may be supported in any convenient manner. If it is desired to have the conveyer 3, including amplifier 5, oscillate during the reproduction of a record, stem 18 may pass through the wall of amplifier 5, as shown at 20, and be supported within the mouth of amplifier 5, as by a bracket 21.

Having now described my invention, what I claim as new therein and desire to protect by Letters Patent is as follows:—

1. In combination, a sound conveyer, a sound modifier mounted within said conveyer, and means comprising a rotatable bobbin and a flexible connection between said bobbin and modifier for moving said modifier into different positions in said conveyer, substantially as described.

2. In combination, a sound conveyer, a sound modifier mounted within said conveyer, resilient means tending to hold said modifier in one position in the air passage in said conveyer, means comprising a rotatable bobbin and a flexible connection between said bobbin and modifier for moving said modifier into other positions in said conveyer, and means normally preventing rotation of said bobbin, substantially as described.

3. In combination, a sound conveyer, a sound modifier mounted within said conveyer, resilient means tending to hold said modifier in one position in the air passage in said conveyer, means comprising a rotatable bobbin and a flexible connection between said bobbin and modifier for moving said modifier into other positions in said conveyer, and friction means for preventing rotation of said bobbin, substantially as described.

4. In combination, a sound conveyer, a sound modifier of a material permitting the passage of sound vibrations therethrough but with diminished intensity mounted within said conveyer, and means comprising a rotatable bobbin and a flexible connection

between said bobbin and modifier for moving said modifier into different positions in said conveyer, substantially as described.

5 5. In combination, a sound conveyer, a sound modifier mounted within said conveyer, resilient means tending to hold said modifier in one position in the air passage in the said conveyer, and means comprising a rotatable bobbin and a flexible connection  
10 between said bobbin and modifier for moving said modifier into other positions in said conveyer, substantially as described.

15 6. In combination, a sound conveyer, a sound modifier mounted within said conveyer, and means comprising a movable member and a flexible member connecting said movable member and modifier for moving said modifier into different positions in said conveyer, substantially as described.

20 7. In combination, a sound conveyer, a sound modifier of a material permitting the passage of sound vibrations therethrough but with diminished intensity mounted

within said conveyer, and means comprising a movable member and a flexible member  
25 connecting said movable member and modifier for moving said modifier into different positions in said conveyer, substantially as described.

8. In combination, a sound conveyer, a  
30 sound modifier mounted within said conveyer, resilient means tending to hold said conveyer in one position in the air passage of the said conveyer, and means comprising a movable member and a flexible mem-  
35 ber connected to said movable member and modifier for moving said modifier into other positions in said conveyer, substantially as described.

This specification signed and witnessed  
40 this 7th day of December 1910.

THOS. A. EDISON.

Witnesses:

DYER SMITH,  
ANNA R. KLEHM.





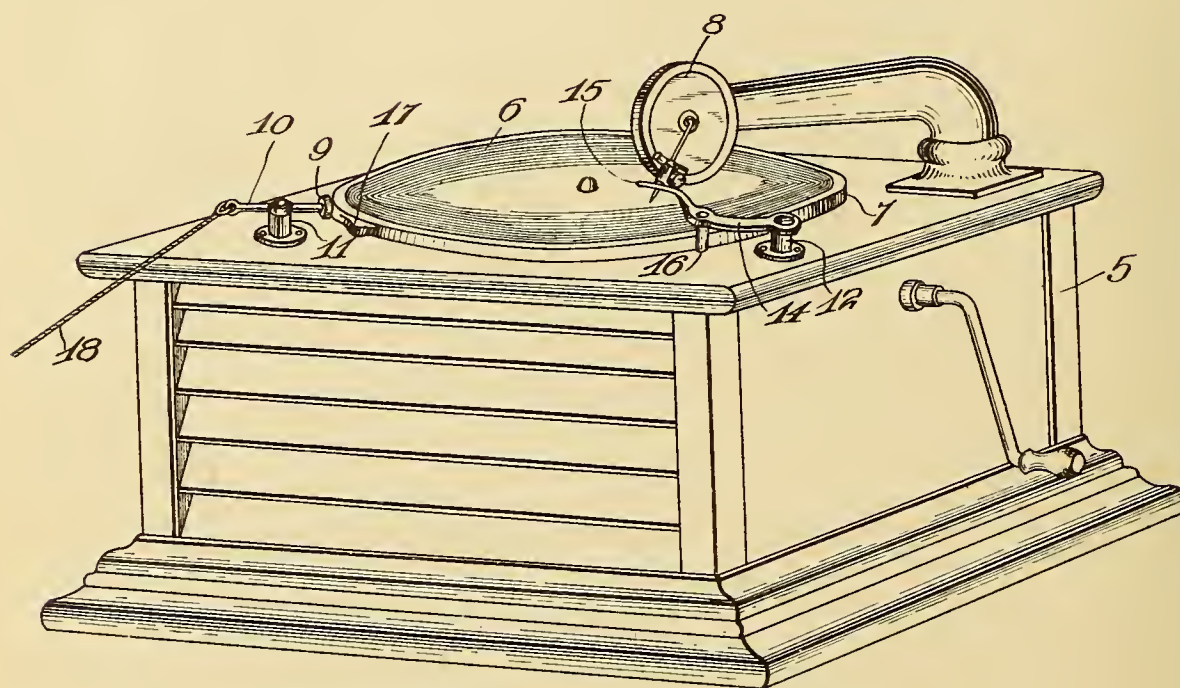




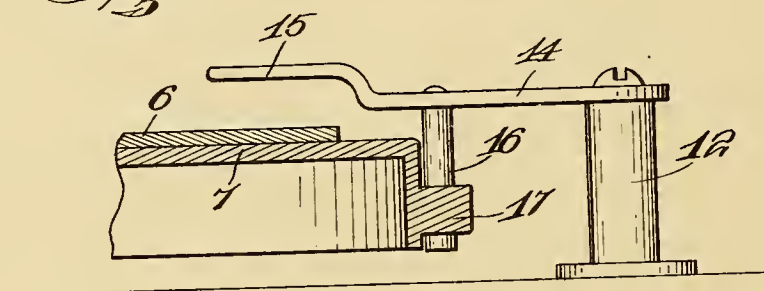
A. STAHL.  
BURGLAR ALARM.  
APPLICATION FILED JAN. 19, 1914.

Patented Sept. 22, 1914.

1,111,190.



*Fig. 1.*



*Fig. 2.*

*Axel Stahl.*  
Inventor

Witnesses  
*H. G. Batchelor*  
*S. J. Lehrer*

by *Milob R. Thomsen.*  
Attorneys

# UNITED STATES PATENT OFFICE.

AXEL STAHL, OF CHICAGO, ILLINOIS.

## BURGLAR-ALARM.

1,111,190.

Specification of Letters Patent.

Patented Sept. 22, 1914.

Application filed January 19, 1914. Serial No. 813,145.

*To all whom it may concern:*

Be it known that I, AXEL STAHL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Burglar-Alarms, of which the following is a specification.

This invention relates to burglar alarms characterized by a talking machine which is started to give an alarm in the event of a window or door being opened by an intruder.

The invention has for its object to provide novel and improved means for controlling the talking machine, and to this end it consists in a combination and arrangement of parts to be hereinafter described and claimed.

In order that the invention may be better understood, reference is had to the accompanying drawing in which—

Figure 1 is a perspective view of the apparatus, and Fig. 2 is a cross-section showing a portion of the controlling mechanism.

Referring specifically to the drawing, 5 denotes an ordinary talking machine having a disk record 6 carried by a rotating table 7 and engageable by a needle or stylus carried by a sound-box 8. The usual brake 9 for the table is also provided, said brake being carried by a lever 10 mounted on a pivot stud 11, which latter is mounted on the top of the casing of the machine. On the top of the casing, at the side of the starting point of the needle, is mounted a stud 12 on which is pivoted, to swing in a horizontal plane, a lever 14 having a prolongation or finger 15 passing beneath the sound-box and holding the latter elevated a sufficient distance to keep the needle out of contact with the record. Between the finger and the pivot, a short stud 16 depends from the lever. The table 7 has a marginal enlargement forming

an abutment or cam 17 into the path of which the stud 16 extends.

A cord 18 is fastened to the brake-lever 10 and carried to the windows and doors over suitable guide pulleys, and fastened to the windows and doors in such a manner that when an intruder opens the same, the cord is given a pull, and the brake-lever is swung on its pivot to disengage the brake from the periphery or edge of the table. The machine, having previously been wound up, now starts, and when the cam 17 strikes the stud 16, the lever 14 is swung on its pivot to swing the part 15 from beneath the sound-box 8, whereupon the latter drops and the needle comes into contact with the record 6, and the alarm is given.

The apparatus is very simple in construction and it can be readily and cheaply installed, any ordinary disk talking machine, slightly modified as described, being all that is necessary besides the brake releasing connections 18.

I claim:

The combination with a talking machine having a sound-box and a turn-table for supporting the record, said turn-table having a marginal abutment, of a lever extending horizontally beneath the sound-box and pivoted to swing in a horizontal plane, said lever when in engagement with the sound box holding the same elevated in inoperative position, and a stud depending from the lever, said stud being in the path of the aforesaid abutment.

In testimony whereof I affix my signature in presence of two witnesses.

AXEL STAHL.

Witnesses:

S. J. LEHRER,

H. G. BATCHELOR.





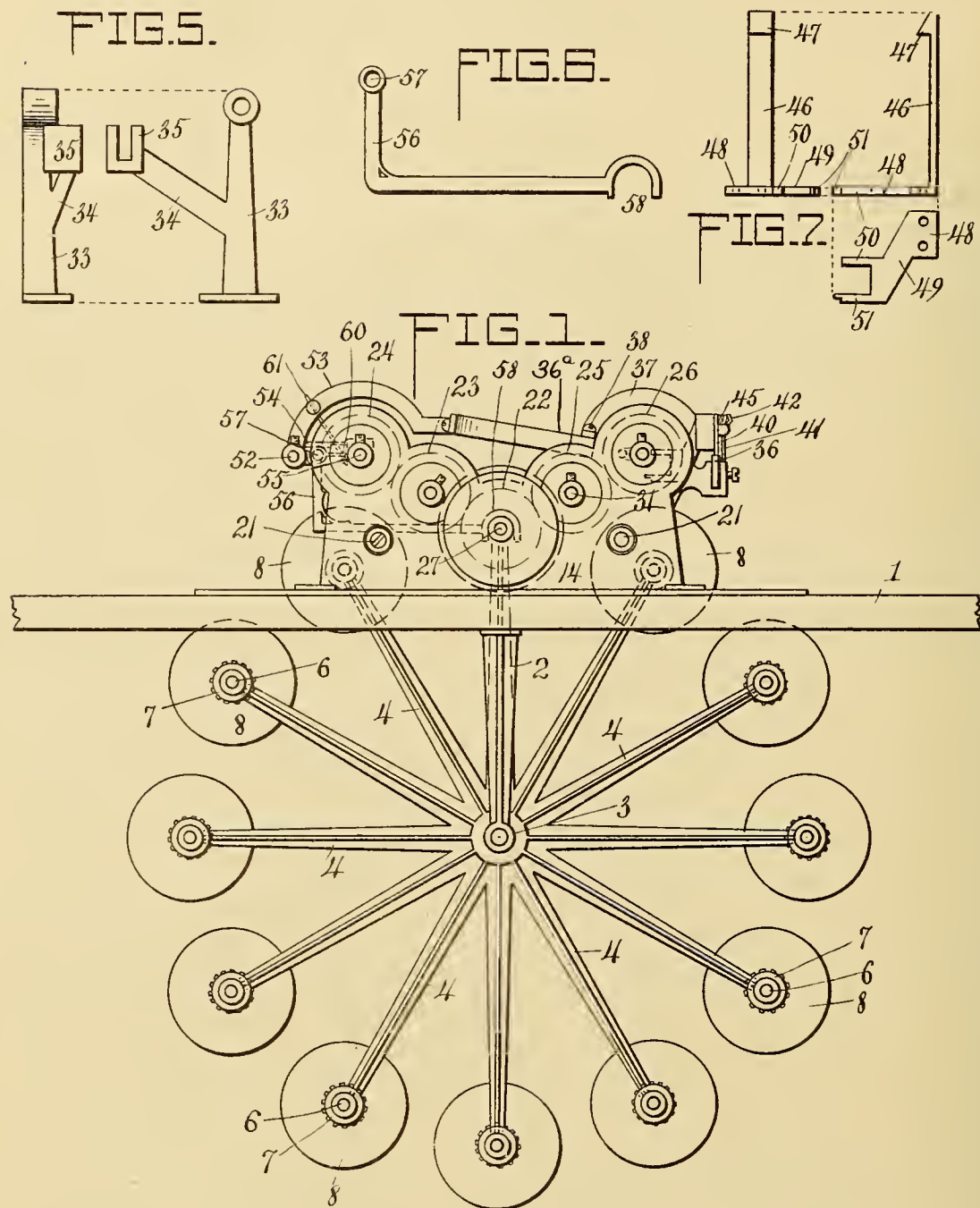
File

H. E. MARKLE.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED AUG. 27, 1906.

1,111,716.

Patented Sept. 22, 1914.

3 SHEETS—SHEET 1.



WITNESSES:

*W. E. Allen*  
*m. B. Hayes.*

INVENTOR

*Hyman E. Markle*

BY

*Edwin S. Clarkson*

Attorney





H. E. MARKLE.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED AUG. 27, 1906.

1,111,716.

Patented Sept. 22, 1914.  
3 SHEETS—SHEET 2.

FIG. 8.

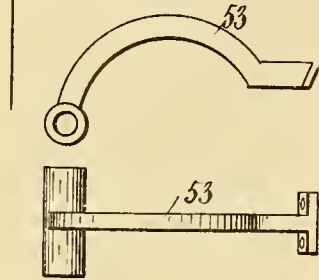


FIG. 9.

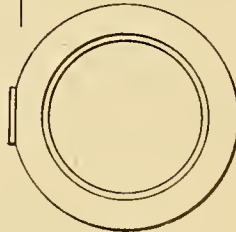
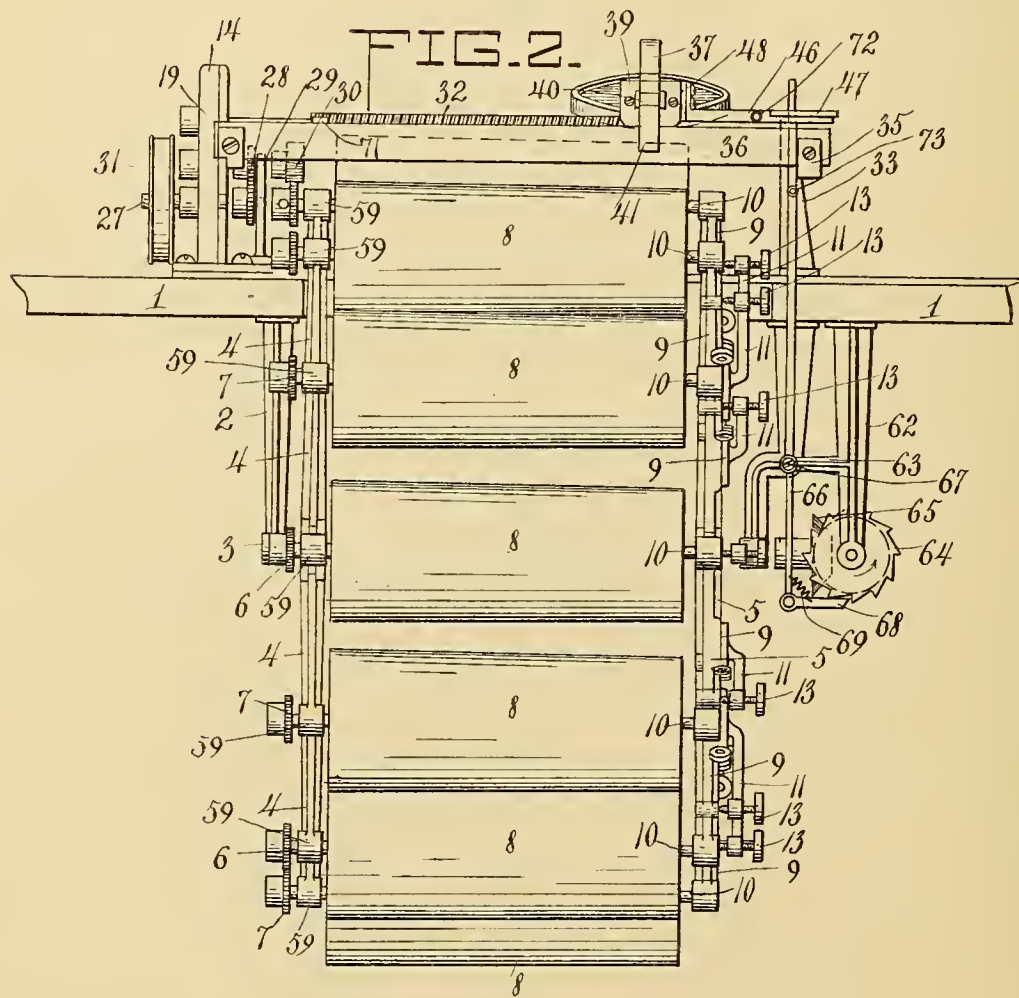
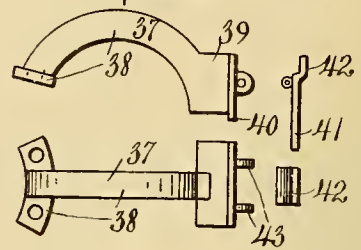


FIG. 10.



WITNESSES:

W. E. Allen  
M. B. Hayes.

INVENTOR

Hyman E. Markle  
BY *Clarence S. Clarkson*  
Attorney





H. E. MARKLE.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED AUG. 27, 1906.

1,111,716.

Patented Sept. 22, 1914.  
3 SHEETS—SHEET 3.

FIG. 3.

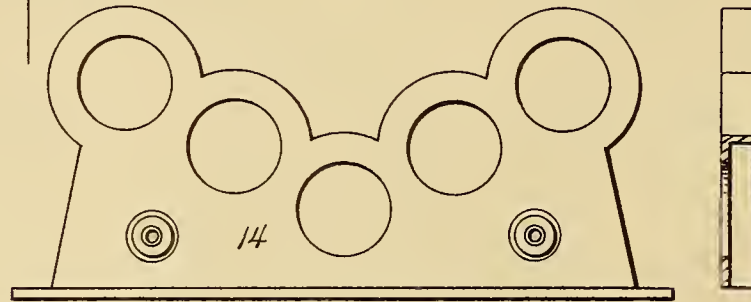


FIG. 4.

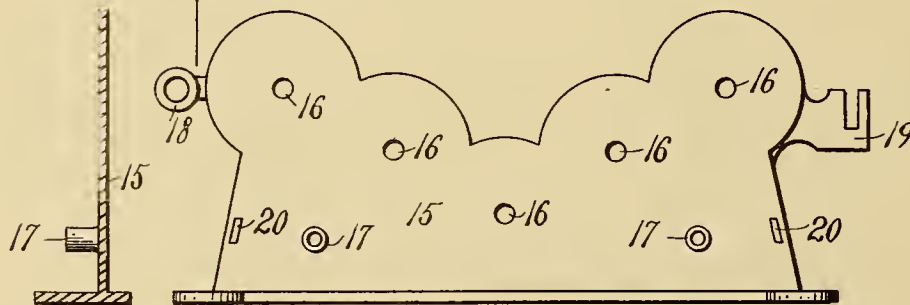


FIG. 11.

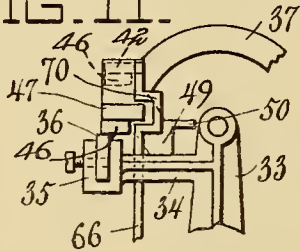


FIG. 12.

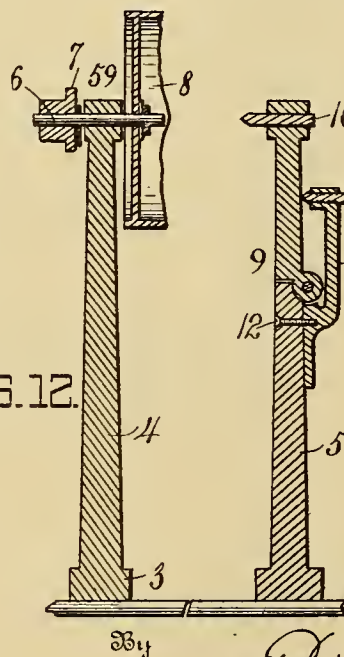


FIG. 13.



Witnesses  
W. E. Allen  
M. B. Hayes.

Inventor  
H. E. Markle  
By  
Clarence S. Clarkson  
Attorney

# UNITED STATES PATENT OFFICE.

HYMAN E. MARKLE, OF NASHVILLE, TENNESSEE.

## SOUND-REPRODUCING MACHINE.

1,111,716.

Specification of Letters Patent.

Patented Sept. 22, 1914.

Application filed August 27, 1906. Serial No. 332,224.

*To all whom it may concern:*

Be it known that I, HYMAN E. MARKLE, citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

My invention relates to sound reproducing machines generally, but more particularly to the multiplex cylinder machine wherein are employed a series of cylinders with means to bring the cylinders successively into operative relation with the reproducer, and it is the object of my invention to improve and simplify this type of machine; and with this and minor objects in view, my invention consists of the parts and combination of parts as will be hereinafter pointed out and claimed.

In the drawings, Figure 1 is a side elevation of a phonograph embodying my invention. Fig. 2 is a front elevation of the same. Figs. 3 and 4 are side elevations of the castings constituting the gear housing. Figs. 5, 6, 7, and 8 are detail views. Fig. 9 is a top plan view of the carriage, Fig. 10 is a top and side view of the arch bar which supports the front of the carriage, the pawl being shown in position for assembling with said bar, Fig. 11 is a detail elevation of the trip mechanism, Fig. 12 is a detail sectional view through one of the arms of the star wheel and cylinder, Fig. 13 is a similar view of opposite star wheel and one of its hinged sections.

1 designates the base or support of the machine having an opening on each side of which are positioned depending arms 2 provided with suitable journal bearings 3 in which are journaled the star wheels 4 and 5. 6 are shafts journaled in the outer ends of the arms of the star wheel 4 on which are keyed pinions 7. 8 are record holding cylinders secured on the shafts 6. The arms of the wheel 5 are each provided with hinged sections 9, the outer end of each of which is provided with a center pin 10 adapted to support one end of the cylinders 8.

11 is a locking lever or key pivoted to the wheel 5 by means of the pivot 12. The outer end of this lever or key 11 is provided with a set screw 13 adapted to bear against the hinged section 9 whereby said section is supported in a vertical position and, with its

centering pin 10, held against the cylinder 8. The set screw enables one to adjust the pressure with which the centering pin 10 bears against the cylinder 8. When ever it is desired to place a record on the cylinder, the lever or key 11 is swung on its pivot parallel with the wheel 5 whereupon the section 9 is free to swing on its hinge away from the wheel, thus freeing the end of the cylinder 8 adjacent to the wheel 5, whereupon the record may be placed upon or removed from its cylinder. As soon as a record is placed upon a cylinder, the section 9 is thrown up and the locking lever or key swung upward on its pivot into the position shown in Fig. 13 and the proper adjustment of the bearing pin 10 against the end of the cylinder is regulated by means of the set screw 13 on said lever 11.

14 and 15 are castings constituting a suitable housing for a train of gear wheels. The casting 15 is provided with journal bearings 16, tubular projections 17 and brackets 18 and 19 on opposite ends and lugs 20, while the casting 14 is provided with screw openings with which the projections 17 register.

21 are screws holding the castings together by passing through the openings in casting 14 and engaging suitable screw threads in said projections or lugs 17. The lugs 20 bear against the ends of the casting 14.

22, 23, 24, 25 and 26 are gear wheels suitably journaled in the housing formed of the castings 4 and 5. On the shaft 27 of the gear wheel 22 is keyed a suitable band or other power wheel.

28 is a pinion keyed to the shaft 31 of the gear wheel 25, said shaft being journaled in the standard 29.

30 is a pinion keyed to the shaft 31 and is adapted to engage the pinions 7 of the star wheel whereby the cylinders are revolved.

The gear wheel 25 meshes with the gear wheel 26.

32 is the return or repeating bar having a worm of the desired pitch formed thereon, the other end of the bar 32 being journaled in the standard 33. The standard 33 is more clearly shown in Figs. 2 and 11 from which it will be seen that it is provided with an arm 34 carrying a U-shaped lug 35 on its outer end. A carriage slide bar 36 is supported at the front of the machine in the lug 35 of the standard 33 and in the lug 19



of the casting 15 in which it is held by means of suitable set screws.

The carriage 36<sup>a</sup>, for carrying the reproducing means, (not shown) is supported in the front by means of the arched bar 37 having lugs 38 by means of which it is secured to the carriage. The outer end of the bar 37 is provided with a cross piece 39 (see Fig. 10) having a depending foot 40 adapted to slide on the slide bar 36 as clearly shown in Fig. 1.

41 is a pawl, the upper end 42 of which is outwardly deflected, the lower end of the pawl depending, normally, below the top of the slide bar 36, as shown in Fig. 1. This pawl is pivoted to the cross piece 39 between lugs 43. A coiled or other suitable spring 45 is secured between the cross piece 39 and the end 42 of the pawl 41 as shown in Fig. 1. The tendency of the spring 45 to throw the lower end of the pawl in toward the carriage is normally resisted by the slide bar 36.

46 is an arm provided with a trip 47 at its outer end, said arm having an integral lug 48, by means of which it is secured to the carriage, the said arm projecting in advance of the carriage, as clearly shown in Fig. 2.

49 is an arm integral with and depending forwardly from the arm 46, the end of which is provided with fingers 50 and 51, to be hereinafter referred to.

52 is a rod, one end of which is fixed in the lug 18 of the casting 15, the other end being suitably supported. The arched bar 53 is slidably mounted on the rod 52 at one end and is secured at its other end to the rear of the carriage, thus coacting with the arched bar 37 to support the carriage 36<sup>a</sup>. An arm 54 (shown partially in dotted lines in Fig. 1) is connected to the outer end of the arched bar 53 and its inner end carries a worm feeding nut, which engages the feed screw 55, whereby the carriage is propelled to traverse a record. The feed screw is keyed to the gear wheel 24.

56 is a bell crank lever pivoted at 57 to the arm 54; the other end of the lever 56 is provided with a yoke 58 (shown in dotted lines in Fig. 1) which is adapted to engage a boss 59 formed on the ends of the arms of the star wheels 4 and 5 whereby said wheels are held against movement while a record is being reproduced.

60 is a rod extending from a pivoted end of the bell crank lever, which has a sliding engagement with a rod 61 fixed to the arched bar 53, so that when the front end of the carriage is raised, the rod 61 forces the rod 50 upward, thus swinging the bell crank lever on its pivot and disengaging the yoked end from the arm of the star wheel, whereupon the wheel is free to be revolved to advance another record into operative position.

62 is a bracket depending from the support 1 provided with an arm 63.

64 is a ratchet wheel suitably journaled on the lower end of the bracket and provided with bevel gear teeth (indicated by a dotted circle in Fig. 2) on its rear side, which mesh with a bevel gear wheel 65 keyed to the shaft of the star wheel 5.

66 is a lever pivoted at 67 to the arm 63; 68 is a pawl pivotally secured to the lower end of the lever 66 and held at a right angle thereto by means of a coiled spring 69 in which position it is in engagement with the ratchet wheel 64. The lever 66 is offset intermediate its upper end and pivot as at 70 which permits the end of the arm 46 to pass the lever without engaging it as the carriage progresses in the reproduction of a record, as shown in full lines in Fig. 11. The path of the finger 50 is below the top of the bar 32 in the forward movement of the carriage. The slide bar 36 is provided with a trip 71 which is adapted to push the pawl 41 from the top of said bar after the carriage has returned to starting position, said trip having a cam-like face.

The operation of the machine is as follows: Records having been placed upon the cylinders 8, and the star wheels locked against movement by the yoked end of the lever 56, the machine is started and the feed screw 55 advances the carriage across the record, the end of the arm 46 passing through the offset 70 in the lever 66. As soon as the carriage has completed its forward movement, the stud 72, which is fast to the repeating bar 32 engages the finger 50 of the arm 49 and continuing in its movement, thereby elevates the arm and through it the carriage until the pawl 41, under the influence of its spring, snaps over the slide bar 36 and its lower end rests upon said bar holding the carriage in its elevated position, in which position the trip 47 on the bar 46 is above the offset in the lever 66 and the finger 51 is in engagement with the repeating bar 32. The elevation of the front end of the carriage causes it to swing at its rear end on the rod 52, thereby freeing the feeding nut from the feed screw 55 and at the same time through the rod 61 and arm 60, freeing the yoked end of the bell crank lever 56 from engagement with the star wheels, thus leaving the wheels free to be revolved. The gears and repeating bar 32 continuing to revolve, the carriage is returned to its starting position, by reason of the engagement between the said bar or worm 32 and the finger 51. In the return movement of the carriage, the trip 47 on the arm 46 strikes the end of the lever 66 above the offset as shown in dotted lines in Fig. 11 and throws the lever over on its pivot 67 which movement, through the pawl 68, revolves the ratchet wheel 64, the bevel gear 65 and the



shaft of the star wheel 5, thereby revolving both star wheels and thus advancing a new record into proper position for reproduction.

5 If it is desired to repeat a record, the arm 46 may be swung on its hinge 72 entirely out of the path of the lever 66, or the lever 66 may be provided with a hinge joint 73 whereby it may be swung entirely out of  
10 the path of the arm 46.

It is of course obvious that many minor changes may be made in the details of construction, without departing from the spirit of the invention, hence, I would have it understood that I do not limit myself to the  
15 exact details shown.

What I claim is:—

1. In a sound reproducing machine, the combination with a multiplex record holder,  
20 of a sound box carriage, bosses on said holder, a locking lever engaging said bosses to lock the holder against movement, and means rigidly fixed to and carried by said carriage for releasing said locking bar from  
25 said bosses when the carriage is raised.

2. In a sound reproducing machine the combination with a multiplex record holder comprising a series of arms, shafts connected to said arms to hold a record, a locking  
30 bar constructed to engage each of said arms as the record holder is revolved, to lock the holder against movement while a record is being reproduced and means fixed to and carried by the carriage for releasing said  
35 locking bar from said arms when the carriage is raised to permit the holder to revolve.

3. In a sound reproducing machine, the combination with a multiplex record holder comprising a series of arms, shafts connected to said arms each to hold a record, bosses on  
40 each of said arms, of a locking bar constructed to engage said bosses to lock the holder against movement while a record is being reproduced and means fixed to and carried by the carriage for releasing said  
45 locking bar from said bosses when the carriage is raised to permit the holder to revolve.

4. In a sound producing machine, the combination with the sound box carriage, of a multiplex record holder revolubly mounted upon a shaft, gear wheels connected to said  
50 shaft, a ratchet wheel formed on the periphery of one of said gear wheels, a lever, a pawl pivotally secured to said lever and adapted to engage said ratchet wheel, said lever extending into the path of the carriage, and means on said carriage adapted  
60 to operate said lever whereby the holder is revolved after the carriage has traversed a record.

5. In a sound reproducing machine, the combination with the sound box carriage  
65 and a multiplex record holder, of a trip

secured to the carriage, a lever constructed to permit the trip to pass it in the forward movement of the carriage, means elevating the carriage after the trip has passed the lever, said trip, in its elevated position being  
70 adapted to operate the lever on the return movement of the carriage and means connecting said lever and the holder whereby the holder is given a partial revolution each time said lever is operated. 75

6. In a graphophone, the combination with a support, a multiplex record holder suspended therefrom on a shaft, pinions connected to each record holder, and a revolving mechanism connected to said shaft, of a  
80 casing on said support, a gear train in said casing, a bar secured at one end to said casing, and extending across the machine and suitably supported at its other end, a sound box carriage movably mounted on  
85 said bar, a forwardly feeding screw for the carriage keyed to one of the gears in said casing, an arm pivotally mounted on the carriage and connecting said screw and carriage, and constructed at one end to engage  
90 the screw, a locking lever adapted to engage the said holder and hold it against movement when the carriage is being moved forward, an arm extending from said lever, a rod rigidly secured to the carriage to elevate  
95 said lever when the carriage is elevated, a slide bar on which one end of the carriage slides, a spring pressed pawl connected with said carriage, the lower end of which is in engagement with the side of the bar in the  
100 forward movement of the carriage, a trip carried by the carriage, a return feeding screw for the carriage, means on the carriage to elevate the carriage at the end of its forward movement and place it in  
105 engagement with the return screw, and a lever in the path of said trip on the return movement of the carriage whereby the multiplex holder is revolved to present a new record, and means to lower the earriage at its starting point. 110

7. In a sound reproducing machine, the combination with a multiplex record holder comprising a series of arms, shafts connected to said arms, each to hold a record, of a  
115 locking bar pivotally mounted on said machine and provided with a hook end adapted to engage said arms to hold the record holder against movement while the record is being reproduced, a carriage and a rod  
120 rigidly fixed to the carriage adapted to engage the locking bar when the earriage is raised.

8. In a sound reproducing machine, the combination with a multiplex record holder,  
125 arms on said holder adapted to receive a record, and a stylus carriage, of a bell-crank lever pivotally mounted on said machine and provided with a yoke at its free end, adapted to engage the said arms to hold the multi- 130

plex holder against movement while a record is being produced, a rod extending from the pivoted end of the bell-crank lever and a rod extending from the stylus carriage adapted to engage the rod of the bell-crank lever when the carriage is raised to swing the bell-crank lever on its pivot and disengage its yoke end from the arm of the wheel, where-

upon the wheel is free to be revolved to advance another record into operative position.

In testimony whereof I affix my signature in presence of two witnesses.

HYMAN E. MARKLE.

Witnesses:

W. H. WILLIAMSON,

C. Y. McCLELLAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

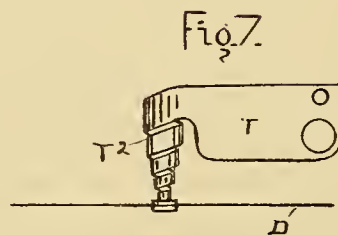
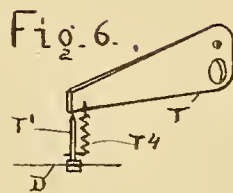
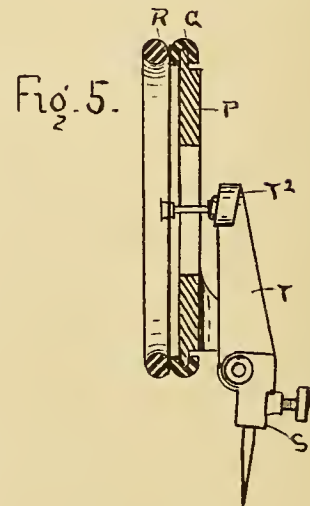
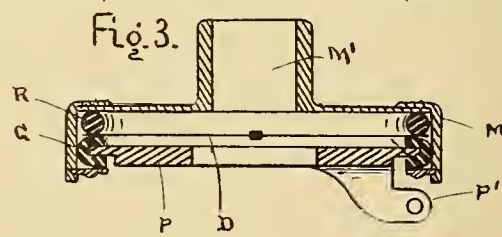
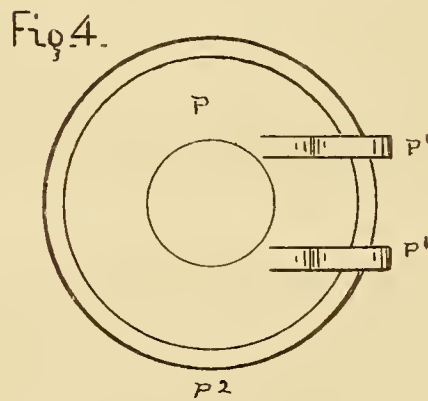
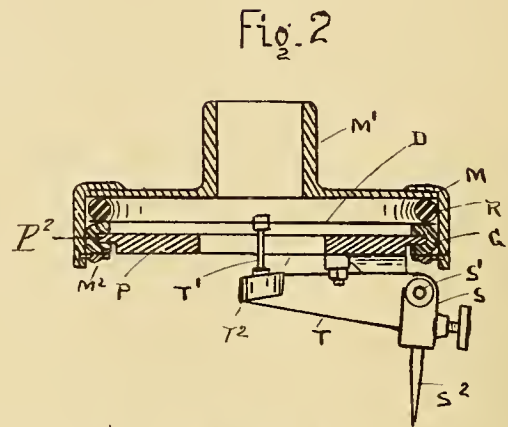
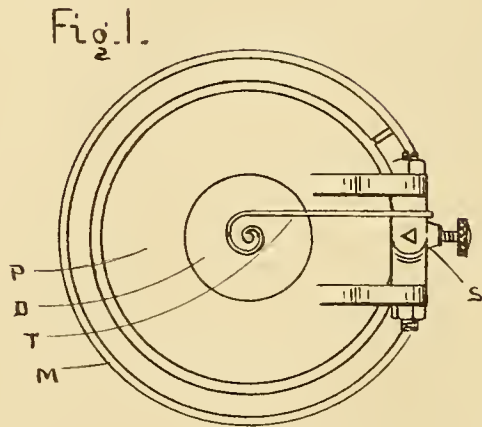




J. H. VAN MATER.  
 PHONOGRAPHIC SOUND BOX.  
 APPLICATION FILED JULY 5, 1913.

1,111,779.

Patented Sept. 29, 1914.  
 2 SHEETS—SHEET 1.



Witnesses:  
 William S. Hildmore  
 A. G. Waterhouse

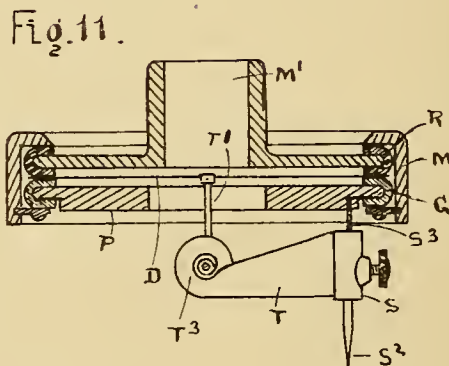
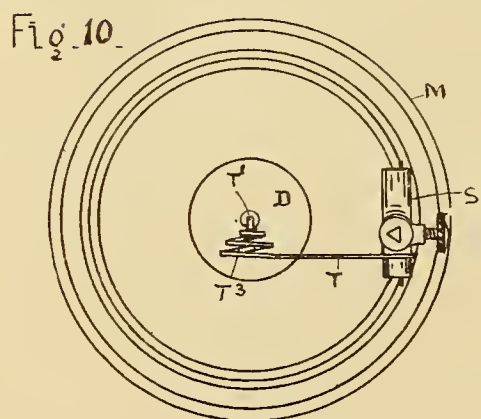
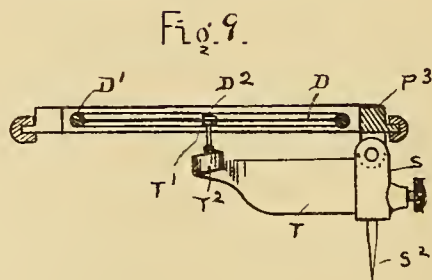
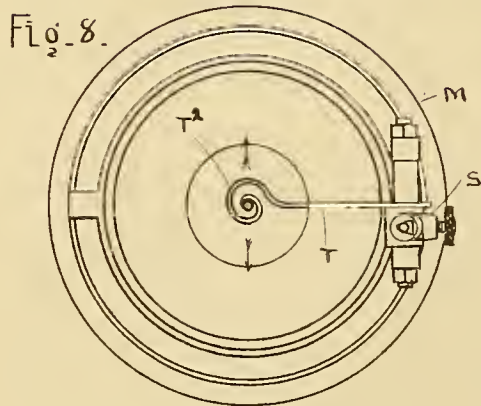
Inventor  
 J. H. Van Mater



J. H. VAN MATER.  
 PHONOGRAPHIC SOUND BOX.  
 APPLICATION FILED JULY 5, 1913.

1,111,779.

Patented Sept. 29, 1914.  
 2 SHEETS—SHEET 2.



Witnesses:  
*William Strickman*  
*A. Q. Waterhouse*

Inventor.  
*J. H. Van Mater*



# UNITED STATES PATENT OFFICE.

JOHN H. VAN MATER, OF ATLANTIC HIGHLANDS, NEW JERSEY.

## PHONOGRAPHIC SOUND-BOX.

1,111,779.

Specification of Letters Patent.

Patented Sept. 29, 1914.

Application filed July 5, 1913. Serial No. 777,537.

*To all whom it may concern:*

Be it known that I, JOHN H. VAN MATER, a citizen of the United States, residing at Atlantic Highlands, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in a Phonographic Sound-Box, of which the following is a description.

My invention relates to means employed for transmitting articulate and musical sound vibrations from the contact needle of a phonograph to its resonant diaphragm, and from which they are transmitted in the form of sound waves by a suitable amplifier.

The object of my invention is to produce and preserve the vibrations peculiar to articulate speech and musical sounds, to the exclusion of those produced by the scratching or frictional effects peculiar to phonographs.

In phonographs, heretofore part of their sound vibrations have been transmitted from the stylus point to the interior of the amplifying horn through mechanical connections or sound conductors leading from the stylus needle to the material forming the sound box, thence through such material to the interior of the horn; and such sounds so transmitted irrespective of a diaphragm or sounding board are generally of an objectionable nature.

In carrying out my invention and to avoid such objectionable sounds, all parts of the mechanism employed for recording and reproducing musical and articulate sound vibrations, including the stylus and its holder are insulated from the sound box and horn, by means of a keeper composed of material which offers an effective resistance to the passage of all sound vibrations through it; so that the only way that such vibrations can be transmitted from the stylus to the interior of the horn must be through a single transmitting member leading from the needle to a diaphragm and thence to the interior of the horn.

My invention further embraces certain forms of a sound transmitting member leading from a stylus to a resonant diaphragm and adapted for carrying with an increasing volume and clearness certain vibrations common to musical sounds and articulate speech which accord with certain vibratory characteristics of said member, and in transmitting with a decreasing force and clear-

ness other sound vibrations which do not accord with the same.

I attain these objects by means illustrated in the accompanying drawings made a part hereof, wherein:

Figure 1, is a plan of the under face of a phonograph sound box embodying my invention; Fig. 2, is a sectional elevation of the device shown by Fig. 1; Fig. 3, shows a part of the device of Fig. 2, in section; Fig. 4, is a plan of the under face of a part of the device of Fig. 1; Fig. 5, is a modified form of the device of Fig. 2, shown in section; Figs. 6 and 7, are modified forms of part of the device of Fig. 1; Figs. 8 and 9, show a working form of my invention, and Figs. 10 and 11, show a practical form of mechanism.

Fig. 1, shows a plan of the shell of a sound box M, in connection with a stylus arm S, for holding a stylus, the same being pivotally connected to an insulated inertia plate P, held within the sound box; also a resonant diaphragm D, with a transmitting member T, leading from the stylus arm S, to the diaphragm D.

Fig. 2, is a sectional elevation of Fig. 1, showing the shell of the sound box M, provided with a sleeve or horn attachment M'. Inside of the box M, are shown two insulating rings R, and G, between which is held insulated from the shell a flexible diaphragm D, while the inertia plate or ring P, is held insulated from both the box M, and the diaphragm by the insulating ring G. The insulated inertia plate P, has a stylus arm S, pivotally connected to it at S'. The transmitting member T, is rigidly united at one end with the stylus arm S, while its other end is provided with a post T', which is joined to the center of the diaphragm D; whereby the post S, is connected to the diaphragm D, by means of the member T, and its post T'. S<sup>2</sup> shows a stylus placed in the arm S. M<sup>2</sup>, is a snap ring used for holding the insulator G, and its plate P in place.

Fig. 3, is a reproduction of part of Fig. 2, with the stylus arm and transmitting member omitted, showing one of the lugs P', by which a stylus arm can be connected to the insulated plate P.

Fig. 4, shows a plan of an inertia plate P, with its two lugs P', P', for pivotally holding a stylus arm; the outwardly extending flange P<sup>2</sup>, being for the purpose of engaging the insulating ring G, as shown in Fig. 2.



Figs. 2 and 3, show the inertia plate P, to which the stylus arm S, is pivotally attached at the fulcrum S', to be of solid material to give it weight, so that its inertia will add to its stability beyond that offered by its elastic insulating ring or holder G; therefore the function of the plate P, is to add to the stability of the fulcrum S', of the stylus arm S, so that vibrations transmitted through the member T, will not be communicated through P, owing to its weight or inertia, nor to the shell of box M, owing to the intervening insulating ring G.

Fig. 5 shows in section a diaphragm and a fulcrum plate P, insulated from each other but held together by the transmitting member T, which is pivoted to the plate P; all of which forms a complete mechanism which can be slipped in or out of a sound box or held therein in an insulated condition by means of the insulating rings G and R.

Fig. 6 shows analogously one of the elements of my invention which relates to the peculiar construction of the transmitting member T, and here shown as a separate article consisting of a blade T, adapted for being rigidly attached to the stylus arm; which blade has a post T', held to it by a spring T<sup>1</sup>, which post is connected to a resonant diaphragm D; the object being to show that any vibrations imparted to the blade in a direction perpendicular to the plane of the diaphragm will be transmitted to it through the post T', while any vibrations in the blade parallel to the plane of the diaphragm will simply swing relatively to the post without vibrating the diaphragm. This same effect is attained by means peculiar to the construction of such a transmitting member as shown by Fig. 7, consisting of a blade T, made throughout of comparatively thin material and having part of it tapering in width and formed into a spiral T<sup>2</sup>, to which a resonant diaphragm D, is directly attached; the spiral part T<sup>2</sup>, being formed so as to be comparatively rigid in the direction perpendicular to the diaphragm and comparatively flexible in a transverse direction whereby vibrations one way in the blade will be transmitted to the diaphragm while those in another way will not be transmitted; as described in connection with Fig. 6.

Figs. 8 and 9, graphically represent a diaphragm D, fixed in a ring D', and centrally connected at D<sup>2</sup>, to the post T', of the transmitting member T, which forms its sole support and holds it free from contact with the plate or ring P<sup>3</sup>, and other parts of the mechanism to which sound vibrations might be communicated.

Figs. 10 and 11, show a plan and a cross-

section of a practical form of mechanism adapted for carrying out my invention; in which the transmitting member or blade T, terminates in a spiral T<sup>3</sup>, with its flat dimensions approximately parallel to that of its blade T, and provided with a post T', for connecting it with the diaphragm D. In this form, the diaphragm D, and fulcrum plate P, connected by a spring joint S<sup>3</sup>, to the stylus arm S, are insulated from each other and from the shell M, while the shell is also insulated from the mouthpiece M', which forms a part of the horn to which it is attached.

In the construction of the transmitting member T, I find that certain features are essential for its better performance, which are; a greater width and rigidity one way than the other as shown; a greater length than that represented by the distance from its stylus arm to its junction with the diaphragm: hence the necessity of a spiral or analogous form to increase its length and not its reach, and the necessity of making it tapering in its width to prevent monotone sound vibrations which would result if its cross-sections were equal throughout its length.

What I claim as my invention is:

1. In a sound recording and reproducing machine, a stylus arm and a vibratory diaphragm united by a sound transmitting member made of thin material tapering in width and formed at its smaller end into a spiral with its wide dimensions perpendicular to the plane of the diaphragm to which it is attached.

2. In a sound recording and reproducing machine, a complete mechanism for receiving and transmitting sound vibrations and comprising an insulated stylus arm and fulcrum, an insulated vibratory diaphragm and a sound transmitting member uniting the stylus arm with the diaphragm and consisting of thin material, tapering in width and formed at its smaller end into a spiral with its wide dimensions perpendicular to the plane of the diaphragm to which it is attached.

3. In a sound recording and reproducing machine, a sound box, a vibratory diaphragm therein, a stylus arm, a transmitting member composed of tapering material and made partly into a spiral for connecting the diaphragm to the arm, and a body supported within but out of contact with said sound box for flexibly holding the stylus arm in place.

J. H. VAN MATER.

Witnesses:

A. G. WATERHOUSE,  
WILLIAM SKIDMORE.



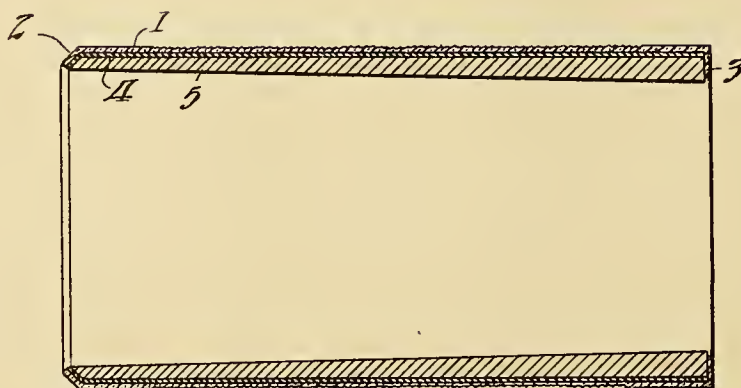


T. A. EDISON.  
PHONOGRAPH RECORD.  
APPLICATION FILED JAN. 20, 1912.

1,111,999.

Patented Sept. 29, 1914.

*Fig. 1*



*Fig. 2*



*Witnesses:*  
Frank Dheunis  
Frederick Bachmann.

*Inventor:*  
Thomas A. Edison  
by Frank L. Dyer  
his Atty.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-RECORD.

1,111,999.

Specification of Letters Patent.

Patented Sept. 29, 1914.

Application filed January 20, 1912. Serial No. 672,397.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the  
5 county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Records, of which the following is a description.

My invention relates to phonograph  
10 records having a surface of wear resisting material, such as celluloid.

The object of my invention is to provide a record of this type permitting the reproduction of the sound record formed  
15 thereon with distinctness, loudness and purity. It has been common to provide records with surface films or veneers of hard materials such as celluloid; but the reproduction from these records has usually been  
20 accompanied by harsh unpleasant scratchy sounds which I have discovered to be due to the fact that the record surface is hard and unyielding so that the reproducer strikes the bottom of the record groove with a more  
25 or less sharp blow. In order to overcome this and other objections and at the same time provide a wear resisting surface for the record, I construct my improved record of a flexible or yielding surface film or veneer  
30 of hard material, such as a thin sheet of celluloid, and provide a resilient or yielding backing therefor, this backing being in my preferred construction formed of a base of hard material, such as plaster of Paris, and  
35 a thin film or layer of resilient material such as rubber, intermediate said surface veneer and base. The resilient material should be a substance, such, for example, as rubber, which yields but is not liable to permanent  
40 deformation under the pressure of the reproducer stylus. The resiliency of the intermediate film or layer permits a slight flexing or yielding of the surface film or veneer under the reproducer so that the sharp blows  
45 of the reproducer are cushioned and the harsh noises above referred to eliminated; while the rigidity of the base prevents a diminution of the amplitude of the sound waves as reproduced, so that the sound  
50 waves on the record surface are transmitted with full amplitude to the reproducer diaphragm. It is understood that the intermediate film above referred to yields only sufficiently to permit the cushioning of the

stylus so as to eliminate the harsh sounds  
55 referred to above.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more  
60 fully understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 represents a central vertical sectional view of a cylindrical sound record  
65 embodying my invention; and Fig. 2 represents a similar view of a disk sound record embodying my invention.

Referring to the drawings and more particularly to Fig. 1, the reference numeral 1  
70 indicates a cylinder of hard material such as celluloid, this cylinder being formed at its ends with inwardly directed flanges 2 and 3. The cylinder 1 is covered on the interior thereof with a thin coating 4 of resilient  
75 material, such as rubber, this coating being preferably applied by rotating the cylinder 1 and applying a solution of the resilient material, as with a brush, to the  
80 interior or bore of the cylinder. When rubber is used, I prefer to employ a solution of the same in benzol. After the layer or film 4 has been allowed to dry, I form on the interior thereof, as by casting, a backing 5 of  
85 hard unyielding material, such as plaster of Paris. In carrying out the casting operation in practice, I place within the coated cylinder 1 a core having a recess or groove opening at one end and in the lateral surface  
90 of the core, and pour the material to be cast into this recess or groove, from which it is led into the annular space between the core and the film 4. The recessed core does not form a part of the present invention.  
95 The base 5 is dried by placing the record within an oven, after which the record may be reamed and otherwise suitably finished. In practice, the core is preferably slightly withdrawn before the base 5 is dried so as  
100 to prevent the formation of an objectionable projection within the bore of the record at the place where the recess in the mold is located. The flanges 2 and 3 are preferably of slightly greater diameter than the corresponding ends of the bore of the base 5,  
105 the record being supported when in place on the phonograph mandrel entirely by the



base 5. The record impression is preferably formed on the surface of the celluloid film 1 prior to the application of the yielding film and the base thereto.

5 In order to produce best results, the film or veneer 1 should be sufficiently thin to be flexible or yielding and the film 4 should be of such a thickness as to cushion the sharp sudden movements of the reproducer stylus  
10 which produce the harsh sounds referred to above without causing such a flexing or yielding of the surface veneer as to appreciably decrease the volume of sound emitted during the reproducing of the record. In  
15 practice, I have found that a suitable thickness for the celluloid surface film is about .018" and that a suitable thickness for the intermediate film of rubber is about .0015".

Referring to Fig. 2, the numerals 1', 4'  
20 and 5' indicate respectively the hard surface film or veneer, yielding intermediate film, and hard base of a disk record constructed in accordance with my invention. The  
25 veneer 1 and film 2, as in the form of my invention described above are preferably formed respectively of celluloid and rubber. For the disk sound records, however, I prefer to provide a base not only of considerable  
30 hardness but also of considerable toughness and capable of adhering firmly to the intermediate film. Suitable materials for such a base are hard rubber or the phenolic condensation products which form the subject  
35 matter of applications of Jonas W. Aylsworth, Serial Nos. 496,060, 543,238 and 604,982. With the disk record as with the cylindrical record, the record impression should be formed in the surface veneer prior  
40 to the application of the flexible film and base thereto. The celluloid for the disk record may be of less thickness than that for the cylindrical record preferably about .005  
45 of an inch in thickness, the yielding film 4' being preferably of substantially the same thickness as the corresponding film in the cylindrical record, *i. e.* about .0015".

I have found in practice that the employment of the yielding intermediate film referred to above not only improves the  
50 quality of the record but also decreases the wear of the stylus on the record and thereby materially increases the life thereof, the hard unyielding base preserving the loudness and distinctness of the record. Various  
55 materials other than those specified above may be used by me and numerous other modifications may be made within the scope of my invention.

60 What I claim as new and desire to protect by Letters Patent is as follows:

1. As a new article of manufacture, a record tablet having a yielding surface veneer of hard material, and a backing therefor comprising a hard substantially unyielding  
65 base and a layer of resilient material located

intermediate said surface veneer and base, said resilient material being yieldable but not liable to permanent deformation under the pressure of the reproducer stylus, substantially as described.

70

2. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a hard substantially unyielding base and a layer of resilient material located intermediate  
75 said surface veneer and base, said resilient material being yieldable but not liable to permanent deformation under the pressure of the reproducer stylus, substantially as described.

80

3. As a new article of manufacture, a record tablet having a yielding surface veneer of hard material, and a backing therefor comprising a hard unyielding base and a layer of rubber located intermediate said  
85 surface veneer and base, substantially as described.

85

4. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a hard unyielding base and a layer of rubber located intermediate said surface  
90 veneer and base, substantially as described.

90

5. As a new article of manufacture, a record tablet having a yielding surface veneer  
95 of hard material, and a backing therefor comprising a plaster base and a layer of resilient material located intermediate said surface veneer and base, said resilient material being yieldable but not liable to permanent deformation under the pressure of the reproducer stylus, substantially as described.

95

6. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a plaster base and a layer of resilient material located intermediate said surface  
105 veneer and base, said resilient material being yieldable but not liable to permanent deformation under the pressure of the reproducer stylus, substantially as described.

105

7. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a plaster base and a layer of rubber located intermediate said surface veneer and  
115 base, substantially as described.

115

8. As a new article of manufacture, a record tablet having a yielding surface veneer of hard material, and a backing therefor comprising a plaster base and a layer of rubber located intermediate said surface veneer and base, substantially as described.

120

9. As a new article of manufacture, a record tablet having a yielding surface veneer of hard material, and a backing therefor comprising a hard unyielding base and a layer of rubber located intermediate said surface veneer and base, said veneer being  
130

125

130



less than .025 inches and said layer less than .002 inches in thickness, substantially as described.

10. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a hard unyielding base and a layer of rubber located intermediate said surface veneer and base, said veneer being less than .025 inches and said layer less than .002 inches in thickness, substantially as described.

11. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a plaster base and a layer of rubber located intermediate said surface veneer and base, said veneer being less than .025 inches and said layer less than .002 inches in thickness, substantially as described.

12. As a new article of manufacture, a record tablet having a yielding surface veneer of hard material, and a backing therefor comprising a hard unyielding base and a layer of rubber located intermediate said surface veneer and base, the thickness of said veneer being approximately .018 inches

and the thickness of said layer approximately .0015 inches, substantially as described.

13. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a hard unyielding base and a layer of rubber located intermediate said surface veneer and base, the thickness of said veneer being approximately .018 inches and the thickness of said layer approximately .0015 inches, substantially as described.

14. As a new article of manufacture, a record tablet having a yielding celluloid surface veneer, and a backing therefor comprising a plaster base and a layer of rubber located intermediate said surface veneer and base, the thickness of said veneer being approximately .018 inches and the thickness of said layer approximately .0015 inches, substantially as described.

This specification signed and witnessed this 19th day of January 1912.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.



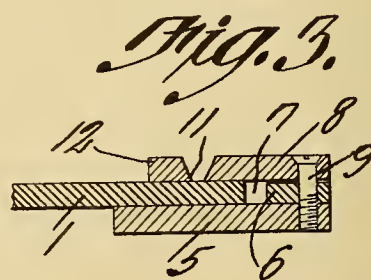
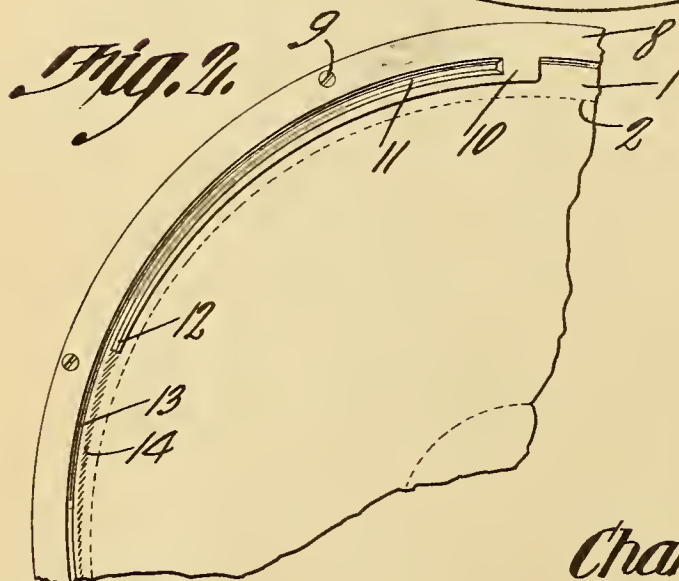
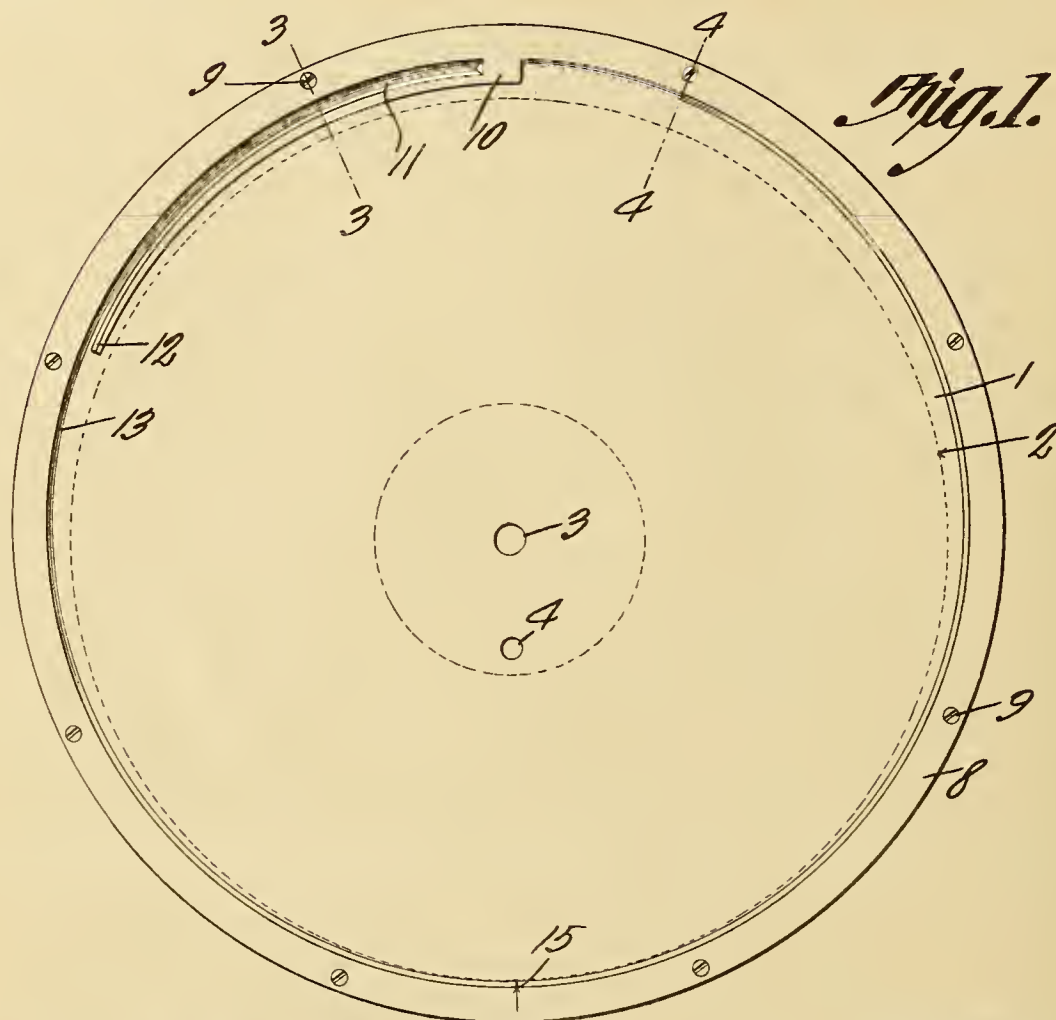




C. W. EBELING.  
 STYLUS GUIDING ATTACHMENT FOR SOUND RECORDS.  
 APPLICATION FILED MAY 20, 1913.

1,112,406.

Patented Sept. 29, 1914.



Witnesses

*J. P. Tomlin*  
*S. Willard*

*Charles W. Ebeling* Inventor

by *C. A. Snow & Co.* Attorneys

# UNITED STATES PATENT OFFICE.

CHARLES W. EBELING, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO  
HARRISON W. ROGERS, OF WHEELING, WEST VIRGINIA.

## STYLUS-GUIDING ATTACHMENT FOR SOUND-RECORDS.

1,112,406.

Specification of Letters Patent.

Patented Sept. 29, 1914.

Application filed May 20, 1913. Serial No. 768,845.

*To all whom it may concern:*

Be it known that I, CHARLES W. EBELING, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Stylus-Guiding Attachment for Sound-Records, of which the following is a specification.

The present invention relates to improvements in stylus guiding attachments for sound records, one object of the present invention, being the provision of means adjustably attached to the record whereby a selected point of the sound grooves will receive the point of the stylus, thus rendering the device especially adapted for use in connection with sound record carriers and motion picture projectors, and particularly with the structure as set forth in co-pending applications of Harrison W. Rogers filed February 7, 1913, Serial Nos. 746,890 and 746,891.

A further object of the present invention is the provision of means which may be properly attached to the periphery of a disk sound record, and which is particularly designed for use upon any of such records, and in which the stylus guiding and starting portion thereof may be properly adjusted longitudinally and transversely of the record, so that the stylus after once positioned will be directed to the desired selected point of the sound groove thus rendering it unnecessary to manually rotate the record for a number of rotations before the introduction of the stylus to the groove or guide the stylus in the phonic groove up to the point of sound rendition, the present device being so designed that the particular point of the groove will be entered without passage through the phonic groove up to the point of sound rendition.

A still further object of the present invention is the provision of a stylus guiding attachment that reinforces the periphery of the record and also by reason of the fact that the stylus guide is formed as a continuation of the phonic groove of the record, whereby the needle is properly guided thereto. It is also found that by forming the stylus receptacle as in the present instance, a projection, the operator, even though operating in a dim or no light, where the device is operated in connection with a projector of a motion picture ma-

chine may "feel" the position of the stylus upon the record without any liability of damaging the record.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a plan view of a disk record with the present attachment applied thereto. Fig. 2 is an enlarged fragmentary plan view of a portion of the record and the attachment adjacent the stylus receiving portion of the attachment. Fig. 3 is a section taken on line 3—3 of Fig. 1. Fig. 4 is a section taken on line 4—4 of Fig. 1.

Referring to all figures of the drawings, the numeral 1 designates a disk sound record, provided with the usual sound groove 2, and the centering aperture 3. A second aperture 4 may or may not be provided for the reception of an auxiliary post, so that when the record is properly positioned upon the platform there will be no liability of a slip thereof when the record carrier is initially rotated or during the rotation thereof.

As particularly shown in Fig. 3, a carrying ring 5 of metal is provided, and is provided with the circumferential projection 6, which when the present device is disposed in operative relation to the disk 1, provides a peripheral recess 7 thereabout, such recess being of varying cross section according to the position of the member 5 upon the record, and as will presently appear.

The stylus guiding and starting ring 8, is attached to the member 5 by means of screws 9, thus forming in reality therewith a clamp, for embracing the opposite sides of the periphery of the record 1, and thus when the screws 9 are properly tightened, permanently attaching the present device to the periphery of the disk upon each face thereof and additionally reinforcing the disk against breakage.

A stylus receiving and guiding channel of groove 11 is formed in the projecting



portion 10 of the member 8, the tongue 12 being disposed to provide the outlet of the groove adjacent the beveled portion 13 of the member 8, such beveled portion 13 being so disposed as to properly guide the stylus after leaving the outlet of the groove or channel 11 to the selected point of the sound groove 2, as for instance at the arrow 15 in Fig. 1. In order to insure the direction of the needle along the beveled portion 13 of the member 8, the portion of the disk adjacent the outlet as shown in Fig. 2, is roughened as at 14, and tends to guide the stylus outwardly.

From the foregoing description, it is evident that with the present device, a permanent means for attachment to a sound record and for guiding a stylus into a selected point of the sound groove is provided, and that the same after testing in a laboratory or otherwise, may be attached to the record and thus render it unnecessary to readjust the device after once securing the same to the record.

What is claimed is:

1. The combination with a sound record disk, of a stylus guiding device attached to the periphery of the disk and provided with a stylus guiding inner surface formed upon a line that is a continuation of a selected convolution of the phonic groove of the record disk, and a tongue carried by the device and spaced from the guiding inner surface thereof to form a stylus receiving channel.

2. The combination with a sound record disk, of a curved stylus guiding device, including a ring attached to the periphery of the disk, said ring being provided with a stylus receiving groove therein formed upon a curve that is a continuation of a selected convolution of the phonic groove of the record disk, the portion of the ring adjacent the outlet of the groove being beveled and forming a connecting medium between the groove of the ring and the selected convolution of the phonic groove.

3. The combination with a sound record disk, of a stylus guiding device, including a ring clamped to and adjacent the periphery of the sound record disk and having a stylus receiving channel, the inner edge of

the ring adjacent the outlet of the channel being beveled to receive and guide the stylus, said inner edge leading into a selected point of the phonic groove of the record disk.

4. The combination with a sound record disk, of a stylus guiding device, including a ring clamped to and adjacent the periphery of the sound record disk, and a projecting tongue at one point of its inner edge providing a stylus receiving channel, the inner edge of the ring adjacent the outlet of the channel leading into a selected point of the phonic groove of the record disk.

5. The combination with a sound record disk, of a stylus guiding device, including a ring clamped to and adjacent the periphery of the sound record disk, and a tongue carried by the ring and providing therewith a stylus receiving channel, the inner edge of the ring adjacent the outlet of the channel being beveled to receive and guide the stylus into a selected point of the phonic groove of the record disk.

6. The combination with a sound record disk, of a stylus guiding device, including two rings, means for spacing the rings apart to form a receptacle to receive the peripheral edge of the record disk, and means for clamping the rings upon the edge of the record disk, one of the rings being provided with a stylus directing groove adjacent its inner edge, the edge of the ring adjacent the outlet of the groove leading to a selected point of the phonic groove of the record disk.

7. The combination with a sound record disk, of a stylus guiding attachment therefor, including one member provided with a stylus guiding means, a second member disposed in spaced relation thereto, and means for securing the members together to embrace the periphery of the disk and adjustably attach the attachment to the disk.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. EBELING.

Witnesses:

SELINA WILLSON,  
I. E. SIMPSON.

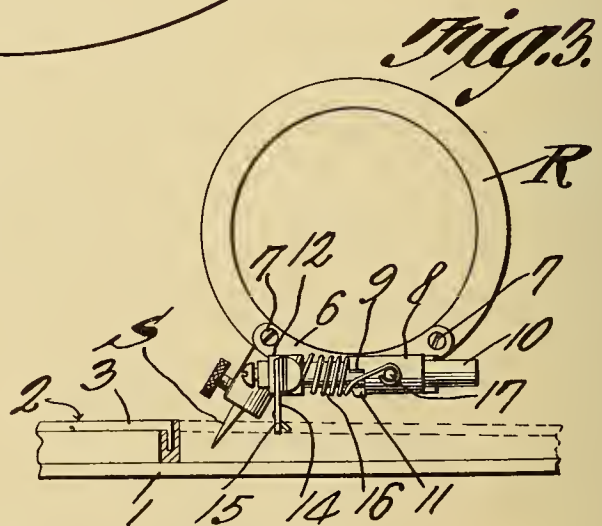
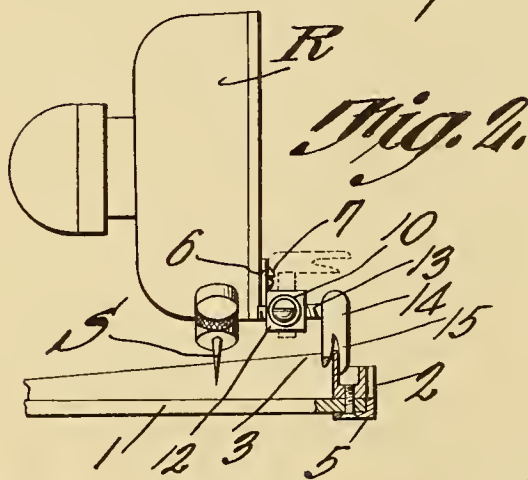
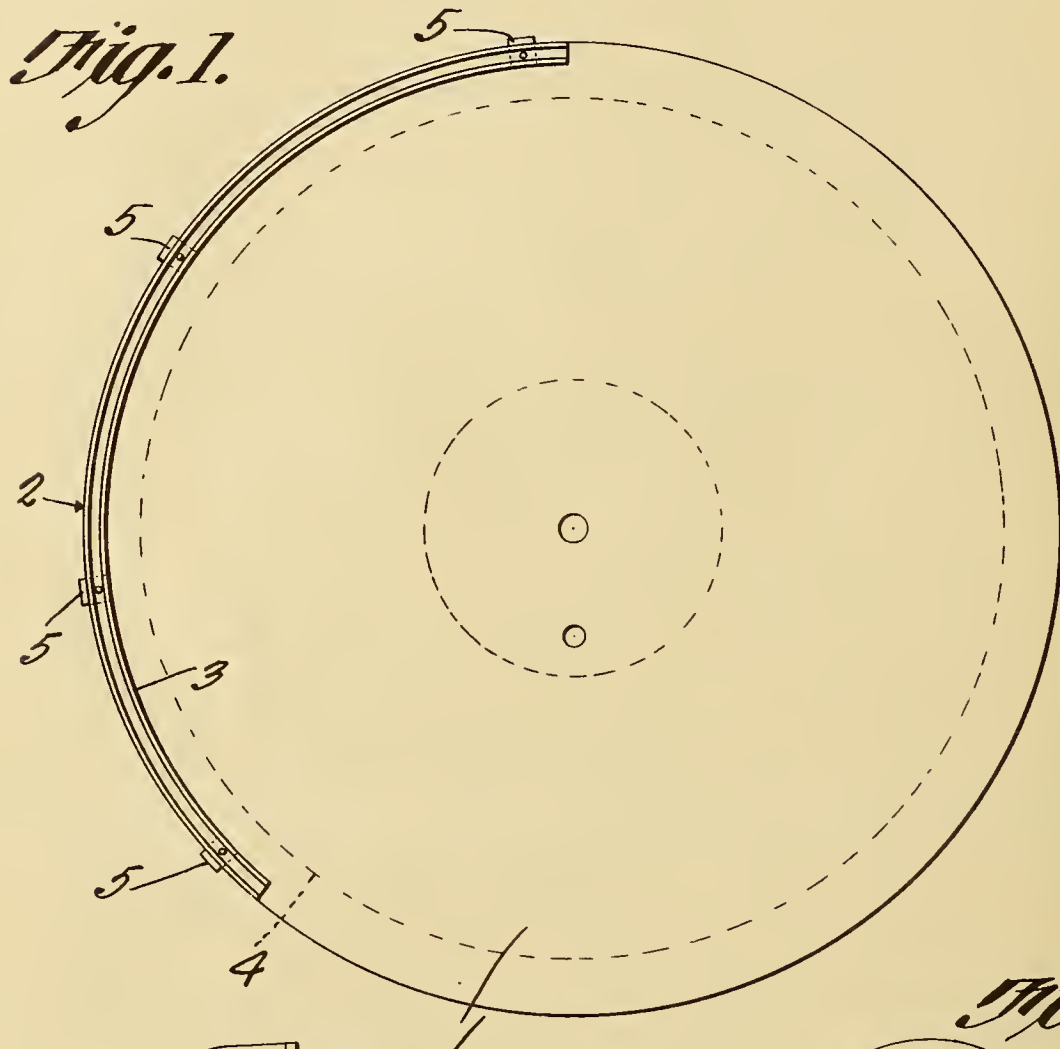




C. W. EBELING.  
 STYLUS GUIDING ATTACHMENT FOR SOUND RECORDS.  
 APPLICATION FILED OCT. 9, 1913.

1,112,407.

Patented Sept. 29, 1914.



Witnesses

*J. P. Lanein*  
*& W. Wilson.*

*Charles W. Ebeling* Inventor  
 by *C. A. Snow & Co.* Attorneys

# UNITED STATES PATENT OFFICE.

CHARLES W. EBELING, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO  
HARRISON W. ROGERS, OF WHEELING, WEST VIRGINIA.

## STYLUS-GUIDING ATTACHMENT FOR SOUND-RECORDS.

1,112,407.

Specification of Letters Patent.

Patented Sept. 29, 1914.

Original application filed May 20, 1913, Serial No. 768,845. Divided and this application filed October 9, 1913. Serial No. 794,307.

*To all whom it may concern:*

Be it known that I, CHARLES W. EBELING, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Stylus-Guiding Attachment for Sound-Records, of which the following is a specification.

The present invention relates to improvements in stylus guiding attachments for sound records, the present application being a divisional application of my co-pending application filed May 20, 1913, Serial No. 768,845, one object of this invention being the provision of coöperable means, carried by the reproducer and the sound record, whereby the stylus is held above the record during a portion of the revolution thereof and finally delivered into the phonic groove thereof at the proper point.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings Figure 1 is a plan view of a disk record with the present attachment applied thereto. Fig. 2 is a side view of a record and reproducer with the present attachment in use in guiding and retaining the stylus from contact with the record. Fig. 3 is a view taken from the right as illustrated in Fig. 2.

Referring to the drawings, the reference character S designates the stylus, carried by the reproducer R, which may be taken indicative of any form of reproducer that is used in connection with a sound reproducing mechanism of the disk type, the record 1 being disposed in usual relation to the reproducer and stylus.

Connected to the periphery of the record, as clearly illustrated, is a segmental member 2, provided with a track or rib 3, whose upper surface is cam-shaped so that the stylus, as will presently appear, when the highest point of the track 3 is engaged, will be held above the surface of the record, as clearly illustrated in Figs. 2 and 3, to be deposited

in the phonic groove 4 when the lowest point of the guiding rail or track 3 is reached. In order to accomplish this, the segmental member 2 is attached at the desired point to the periphery of the disk 1, by means of the fastening cleats 5.

The portion of the present device carried by the reproducer R, includes an attaching plate 6, attached to such reproducer by means of screws 7. A sleeve 8 is carried fixedly by the plate 6, and is provided with a recessed and shouldered portion 9, which as will presently appear, limits the rotation of the rotatable stem or spindle 10. This stem or spindle 10 is provided with a pin 11, which limits the inward longitudinal movement of the spindle relatively to the sleeve 8, and carries upon the opposite end, the block 12, which in turn carries the outwardly extending screw 13 to which is attached the arm 14. This arm 14 is provided with the forked end 15, which is disposed to fit upon the rib or track 3, and as clearly shown in Figs. 2 and 3, holds the reproducer R in such position, that the pointed end of the stylus S will be elevated above the surface of the record.

A spring 16 is coiled upon the spindle 10, between the inner end of the sleeve 8, and the block 12, and has one terminal secured at 17 to the sleeve 8, while the other terminal is attached to the block 12, said spring having a normal tension to elevate the screw 13, and the arm 14 to the dotted line position, Fig. 2. When the forked end 15 of the arm 14 is positioned upon the track or rib 3, the spring 16 is wound, but due to the weight of the reproducer R, the parts will assume the position, as shown in Figs. 2 and 3, so that as the disk 1 is rotated, the forked end 15 of the arm 14 will ride upon the rib 3 and when the same has become disengaged therefrom, the pointed end of the stylus S will be presented to and placed at the selected point of the phonic groove of the record. When the arm 14 has been released, the spring 16 will move the same to the dotted line position, Fig. 2, so that the arm 15 will be out of the path of the rib or track 3, as the same again approaches the stylus and reproducer due to the rotation of the record.

In putting the present invention into practice, the track 3 is properly attached and



adjusted relatively to the record, so that when the stylus carried by the reproducer is held above the record by means of the arm 14, the rotation of the record through its platform and the consequent movement of the track 3 will cause the gradual lowering of the reproducer and stylus so that the point of the stylus will be presented to a selected point, or at the beginning of the phonic groove of the record. The curve of the track 3 is parallel to the curve of the phonic groove 4 to thus insure the proper delivery of the stylus to the phonic groove.

What is claimed is:

1. The combination with a sound record and a reproducer and stylus, of means for placing the stylus in a selected point of the phonic groove of the record, including a raised track carried by the disk adjacent the periphery thereof, said track having its upper edge formed with a gradual incline and upon a curve parallel to the phonic groove, and means carried by the reproducer for sliding engagement with the track to hold the stylus above the record until gradually lowered by the inclined portion of the track into the phonic groove.

2. The combination with a sound record and a reproducer and stylus, of means for placing the stylus in a selected point of the phonic groove of the record, including a raised track carried by the disk adjacent the periphery thereof, said track having its upper edge formed with a gradual incline and upon a curve parallel to the phonic groove, laterally swinging means carried by the reproducer for sliding engagement with the track to hold the stylus above the record until gradually lowered by the inclined portion of the track into the phonic groove, and a spring for swinging the track engaging means out of the path of the track after the stylus has been placed in the phonic groove.

3. The combination with a sound record disk and a reproducer and stylus, of means for placing the stylus in a selected point of the phonic groove of the record disk, including a raised track, means carried thereby for attaching the track to the record disk adjacent the periphery thereof, said track having its upper edge formed with a gradual incline and upon a curve parallel to the phonic groove, and means carried by the reproducer for sliding engagement with the track to hold the stylus above the record disk until gradually lowered by the inclined portion of the track into the phonic groove.

4. The combination with a sound record disk and a reproducer and stylus, of means for placing the stylus in a selected point of the phonic groove of the record disk, including a raised track, means carried thereby for attaching the track to the record disk adjacent the periphery thereof, said track having its upper edge formed with a gradual incline and upon a curve parallel to the phonic groove, laterally swinging means carried by the reproducer for sliding engagement with the track to hold the stylus above the record disk until gradually lowered by the inclined portion of the track into the phonic groove, and a spring for swinging the track engaging means out of the path of the track after the stylus has been placed in the phonic groove.

5. The combination with a sound record disk and a reproducer and stylus, of means for placing the stylus in a selected point of the phonic groove of the record disk, including a curved support, means for attaching the support to the record disk, a raised track carried by the support, said track having its upper edge formed with a gradual incline and upon a curve parallel to the phonic groove, and means carried by the reproducer for sliding engagement with the track to hold the stylus above the record disk until gradually lowered by the inclined portion of the track into the phonic groove.

6. The combination with a sound record disk and a reproducer and stylus, of means for placing the stylus in a selected point of the phonic groove of the record disk, including a curved support, means for attaching the support to the record disk, a raised track carried by the support, said track having its upper edge formed with a gradual incline and upon a curve parallel to the phonic groove, laterally swinging means carried by the reproducer for sliding engagement with the track to hold the stylus above the record disk until gradually lowered by the inclined portion of the track into the phonic groove, and a spring for swinging the track engaging means out of the path of the track after the stylus has been placed in the phonic groove.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. EBELING.

Witnesses:

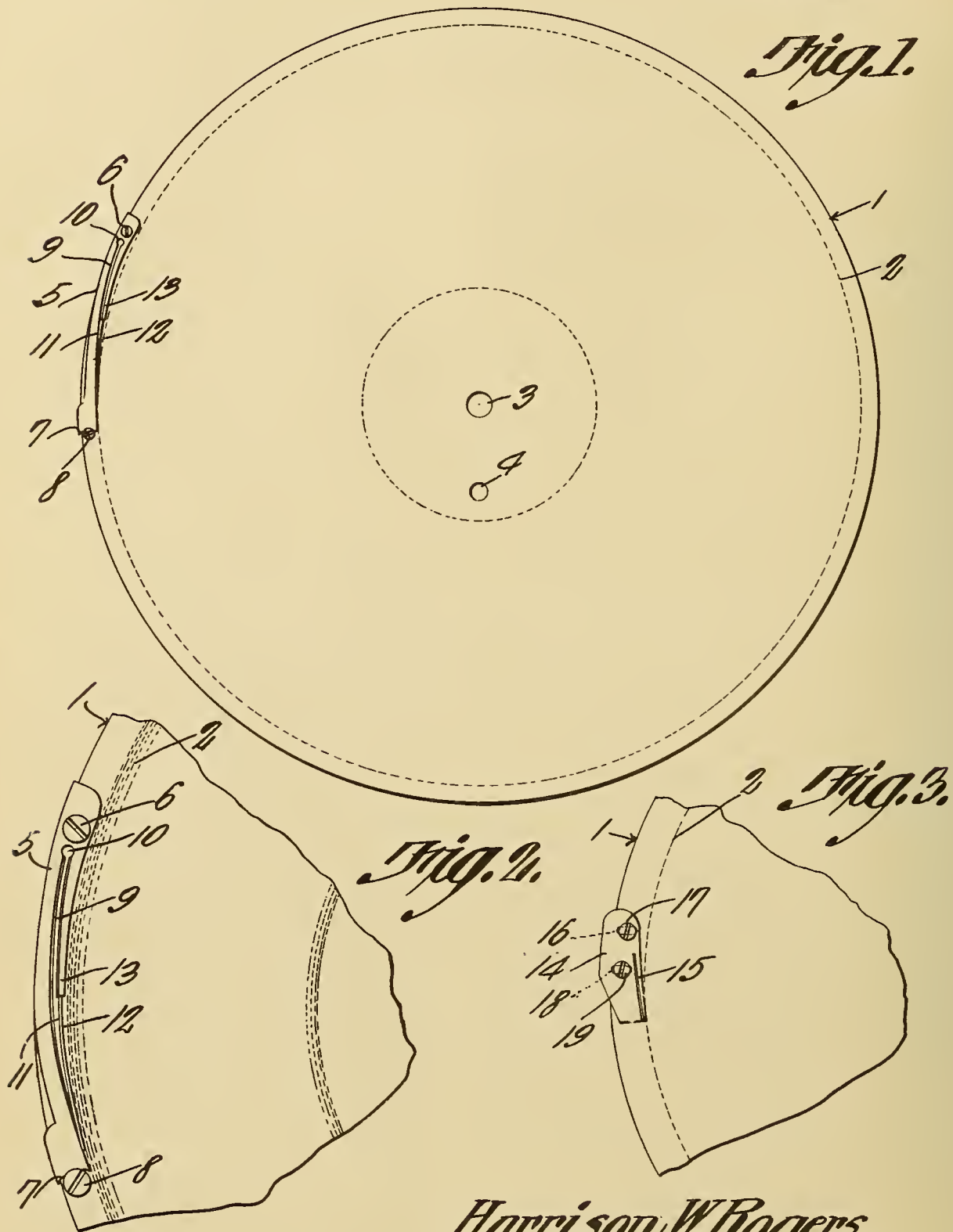
FRED J. WHELAN,  
MAY MULLANE.



H. W. ROGERS.  
 STYLUS GUIDING ATTACHMENT FOR SOUND RECORDS.  
 APPLICATION FILED MAY 20, 1913.

1,112,838.

Patented Oct. 6, 1914.  
 2 SHEETS—SHEET 1.



Witnesses

*J. P. Tomlin*  
*S. Willow*

*Harrison W. Rogers* Inventor  
 by *C. A. Snow & Co.* Attorneys



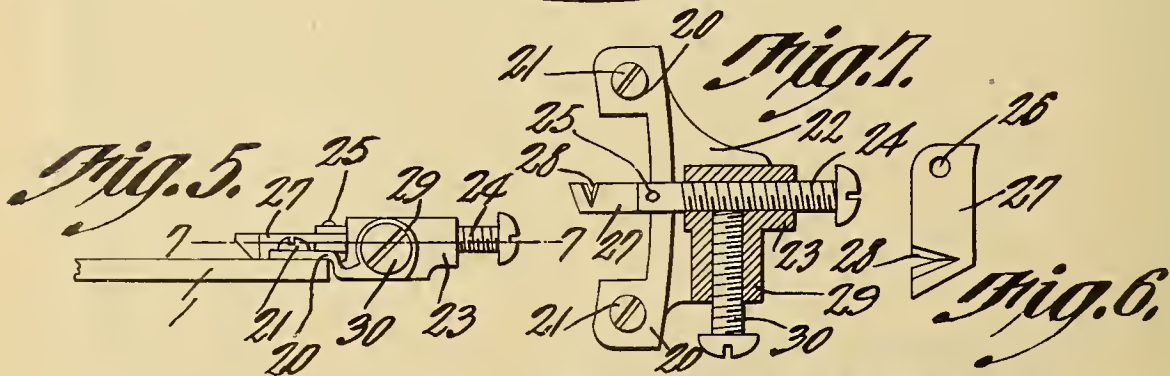
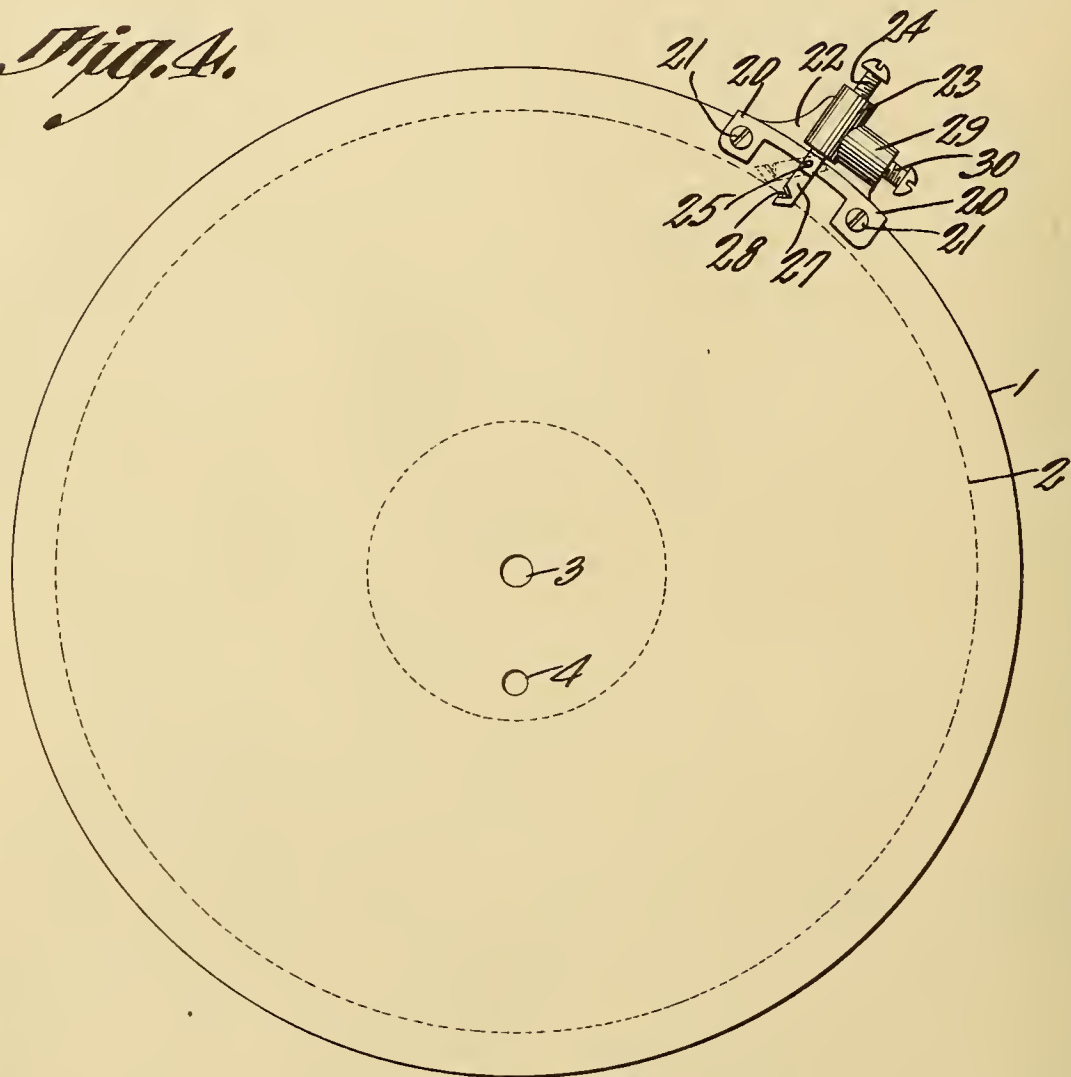


H. W. ROGERS.  
 STYLUS GUIDING ATTACHMENT FOR SOUND RECORDS.  
 APPLICATION FILED MAY 20, 1913.

1,112,838.

Patented Oct. 6, 1914.  
 2 SHEETS—SHEET 2.

*Fig. 4.*



Witnesses

*J. P. Tomein*  
*S. Wilkox.*

*Harrison W. Rogers*

Inventor

by

*C. A. Snow & Co.*

Attorneys

# UNITED STATES PATENT OFFICE.

HARRISON W. ROGERS, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO  
CHARLES W. EBELING, OF WHEELING, WEST VIRGINIA.

## STYLUS-GUIDING ATTACHMENT FOR SOUND-RECORDS.

1,112,838.

Specification of Letters Patent.

Patented Oct. 6, 1914.

Application filed May 20, 1913. Serial No. 768,831.

*To all whom it may concern:*

Be it known that I, HARRISON W. ROGERS, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Stylus-Guiding Attachment for Sound-Records, of which the following is a specification.

The present invention relates to improvements in stylus guiding and starting attachments for sound records, one object of the invention being the provision of an attachment adapted to be connected to and carried by a sound record, and provided with means whereby the stylus will be properly guided to a selected point of the sound groove, thus producing a device which is especially adapted for use in connection with a record carrier operated from a projector mechanism, as particularly set forth in a copending application filed February 7, 1913, Serial No. 746,890, the present attachment rendering it an easy matter for the operator to position the stylus for entering a selected point of the sound groove when the record carrier is operated at the proper time through the projector mechanism.

A further object of the present invention is the provision of an attachment carrying a stylus receiving and guiding portion which is so constructed as to be readily adjusted relatively to the sound groove of the record, so that the stylus will be started at a selected point of the groove, and without the necessity of causing the record to be rotated a plurality of revolutions before the sound wave forming portion of the record is in operable engagement with the stylus.

A still further object of the present invention is the provision of a stylus guiding attachment, which will reinforce the sound record at the starting point of the phonic groove, in that a metal, or other hard substance is placed to receive the initial presentation and guiding of the stylus. This substance is provided with means for insuring the direction of the stylus into the sound groove, at its beginning or at any "lead in" point of such groove. This feature cannot be too greatly emphasized, for where the record is used in a booth with a

motion picture machine projector, a stylus positioning and guiding means must itself be durable and the record at the starting point must be reinforced to withstand the resulting hard usage. By making the guide a projection above the record surface, a means by which the operator may "feel" the position for inserting the stylus in the dim or no light of the booth is afforded, and thus at all times is provided means whereby the proper positioning of the stylus is assured.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a plan view of a disk record with one form of the present invention applied thereto. Fig. 2 is a fragmentary portion of the disk showing the structure as shown in Fig. 1 upon a larger scale. Fig. 3 is a view similar to Fig. 2 showing a modified construction of the present invention. Fig. 4 is a view similar to Fig. 1 showing another modified construction of stylus guiding and starting device or attachment. Fig. 5 is a side elevation of the device with a portion of the record in elevation. Fig. 6 is a detail view of the pivoted stylus starting and guiding member thereof. Fig. 7 is a section taken on line 7—7 of Fig. 5.

Referring to the drawings, the numeral 1 designates a disk record, which is provided with the sound grooves 2 and with the central post receiving aperture 3, there being provided, if found necessary, an additional aperture 4 for the reception of an auxiliary post carried by the disk platform (not shown) to insure the proper rotation of the disk and prevent the slipping thereof as has been found desirable when the present construction is used in connection with a motion picture projector.

In the form of attachment shown in Figs. 1 and 2, a metal strip or plate 5 is attached



by a screw 6 to the outer periphery of the record or at any desired point thereof, such connection forming a pivoting means so that the notch end 7 of such plate may receive the locking screw 8, at any desired adjustment, and the stylus guiding groove 9 of the present device may be directed so that the portion 11 thereof will be disposed to direct the stylus (not shown) to a selected point of the sound groove 2. The closed end of the groove 9 is enlarged, as at 10, for the initial reception of the stylus thus providing an easy means for guiding the point of the stylus into the channel or groove 9 when the sound record is properly positioned upon the carrier portion of the reproducing mechanism. The curved wall or outlet portion of the stylus guiding channel or groove 9 is formed so that the centrifugal force of the record in rotating will tend to hold the stylus thereagainst, and as the plate 5 is adjusted so that the end connected at 7—8 may be moved to and from the sound groove 2, it is evident that the stylus will be guided into any selected portion of such groove. In order to assist the centrifugal force in holding the stylus against the outlet portion 11 of the channel 9, the tongue 13 of the plate 5 has disposed in the outer end thereof a flat spring 12, which has a normal tension to close the channel by engaging the curved portion 11 thereof and thus offer sufficient resilient resistance to the stylus as to hold the same against the plate 5 and thus relieve any tendency of any of the grooves 2 adjacent the periphery of the record from moving the stylus farther into such grooves than is desirable.

In the structure shown in Fig. 3, the stylus guiding attachment 14, is provided with a groove 15 therein for the reception of the point of the stylus, and such groove is inclined toward the reduced end thereof so that by means of the two slots 16 and 18, and the securing screws 17 and 19, the plate 14 may be adjustably attached to the periphery of the record 1 so that the outlet end of such groove may be positioned to direct the stylus to any selected point in the sound groove 2. In this attachment inasmuch as the point of the stylus does not ride upon any portion of the record 1 until it is delivered from the outlet end of the groove 15 into the sound groove of the record, it is apparent that there is no necessity for the employment of a spring, as the spring 12 in the structure shown in Figs. 1 and 2, it simply being necessary to adjust the screws 17 and 19, so that the outlet end of the groove 15 is properly positioned relatively to the desired or selected point of the sound groove of the record.

In the form of attachment shown in Figs. 4, 5, 6 and 7, two apertured lugs 20 are provided and are secured to the disk 1 through the two screws 21, the plate 22 carried by

the apertured lugs 20 being provided with a radially disposed threaded sleeve 23, for the reception of the adjusting and carrying screw 24. This screw 24 has disposed in its inner end a pivoting pin 25 which extends through the aperture 26 of the stylus guiding pivoted member 27. This member 27, as clearly shown in Figs. 4 and 6, is provided with the stylus receiving notch or recess 28, the walls of which are inclined, to properly receive the point of the stylus and direct the same to any selected point of the sound groove 2. It will thus be seen that by adjusting the screw 24, the guiding recess 28 may be positioned at any desired point relatively to the sound groove 2, and that when the disk is properly rotating, that the stylus will be engaged by the side of the pivoted member 27 opposite to the groove upon the first rotation of the disk, and that due to the pivoting of such member at 25—26, the same will be flexible or moved to the dotted line position Fig. 4, and thus be automatically placed out of the path of the stylus during the continuous rotation of the disk.

In order to provide a means for locking the adjusting screw 24 in any desired adjustment, and thus making the guide a permanent guide relatively to the sound groove 2 of a particular record, a threaded sleeve 29 is in communication with the sleeve 23, and has disposed therein a set or locking screw 30. This screw 30 is disposed to engage the adjusting screw 24 at the junction of the two sleeves and thus lock the same against longitudinal and rotary movements.

From the foregoing description, taken in connection with the drawings, it is evident that the present attachment may be readily attached to any record and that due to the stylus receiving and guiding means thereof, such means may be adjusted to any point of the record so that the point of entry of the stylus into the sound groove may be selected, and such selected point made permanent as long as the guiding and starting device of the attachment is held in such adjustment. It is also apparent that with the present attachment, it is unnecessary to rotate the disk a predetermined number of times before the stylus enters the selected point of the sound groove, and that by means of the same, any point of the sound groove may be the point of selection and such device may be readily attached to any record.

It will thus be seen that all of the present guides are adjustable transversely of the phonic groove, thus permitting the device to be easily attached to and positioned upon sound records, the same after being once set and clamped in place reinforcing the record at the starting point of the phonic groove and by reason of the fact that the



guiding groove or slot is placed as a continuation of the phonic groove, it insures the delivery of the stylus into the phonic groove without any undue cutting or  
 5 abrasion of the groove at such point.

What is claimed is:

1. The combination with a sound record disk, of a plate provided with a stylus guiding means, means for pivotally connecting  
 10 one end of the plate to the disk, and means for locking the plate in adjusted position, whereby the stylus guiding means of the plate may be positioned to guide the stylus into a selected point of the phonic groove.

15 2. The combination with a sound record, of a plate provided with a stylus guiding means, means to adjustably attach the plate to the record, and means for coaction with the guiding means to insure the positioning  
 20 of the stylus in a selected point of a sound groove.

3. The combination with a sound record, of a stylus guiding device, including a plate having a slot therein forming a tongue upon  
 25 the side adjacent the phonic groove of the record, means for securing the end of the plate adjacent the closed end of the slot as the hinging point of the plate to the record, and means for adjustably securing the free  
 30 end of the plate to the record to position the

outlet of the slot relatively to a selected point of the phonic groove of the record.

4. The combination with a sound record, of a stylus guiding device for guiding a stylus to a selected point of the phonic  
 35 groove of the record, including a plate provided with a stylus receiving slot therein, said slot providing a tongue upon the inner side of the plate, a resilient member carried by the free end of the tongue and having a  
 40 tension toward the plate to assist in holding the stylus against the adjacent wall of the slot of the plate during the rotation of the disk, means for pivotally connecting the end of the plate adjacent the closed end of the  
 45 slot to the record to permit the slotted end movement relatively to the phonic groove, and adjustable means for fixedly securing the plate to the record, such adjustment determining the position of the stylus receiv-  
 50 ing slot and consequently the point at which the stylus enters the phonic groove of the record.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

HARRISON W. ROGERS.

Witnesses:

SELINA WILLSON,

I. E. SIMPSON.







A. L. ROETHE.  
 GRAPHOPHONE AND GRAMOPHONE SOUND BOX.  
 APPLICATION FILED DEC. 26, 1912.

1,113,911.

Patented Oct. 13, 1914.

Fig. 2.

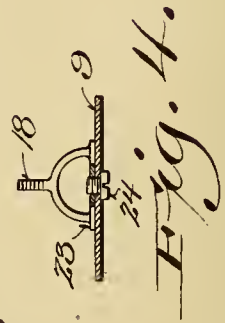
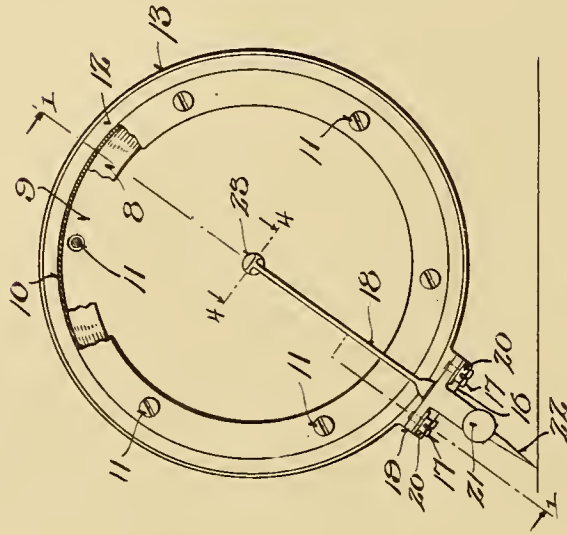
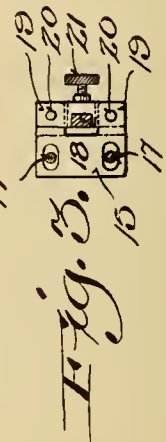
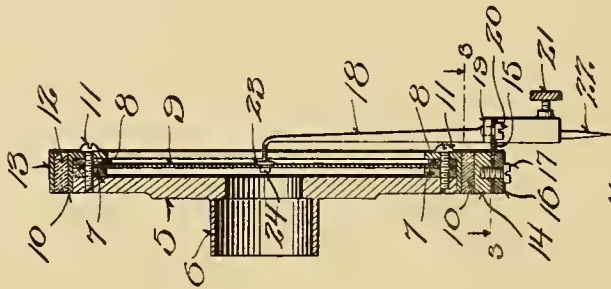


Fig. 1.



Inventor:

Albert L. Roethe

By *Clapham & Young*

Attorneys.

Witnesses:  
*Clapham & Young*  
*May Downey*

# UNITED STATES PATENT OFFICE.

ALBERT L. ROETHE, OF MILWAUKEE, WISCONSIN.

GRAPHOPHONE AND GRAMOPHONE SOUND-BOX.

1,113,911.

Specification of Letters Patent.

Patented Oct. 13, 1914.

Application filed December 26, 1912. Serial No. 738,716.

*To all whom it may concern:*

Be it known that I, ALBERT L. ROETHE, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Graphophone and Gramophone Sound-Boxes; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention consists in what is herein particularly set forth with reference to the accompanying drawings and pointed out in the claims of this specification, its objects being to eliminate hissing noise in sound reproductions from graphophone and gramophone records and to improve the tone of such reproductions by means of improved sound boxes to which my invention relates.

Figure 1 of the drawings represents a sectional view of one of my improved sound-boxes and is indicated by line 1—1 in Fig. 2; Fig. 2 of said drawings represents a side elevation of the sound-box partly broken away; Fig. 3, a plan view of a detail of said sound-box partly in horizontal section as indicated by line 3—3 in Fig. 1, and Fig. 4, a partly sectional view of another detail of the aforesaid sound-box on the plane indicated by line 4—4 in Fig. 2.

Referring by numerals to the drawings, 5 indicates the centrally apertured disk of a graphophone or gramophone sound-box, embodying my improvements, and 6 an attaching sleeve extending from the outer side of said disk open to the said aperture. Parallel to the disk between insulating gaskets 7 and 8 is the diaphragm 9 of the sound-box under the inwardly extending flange portion of a clamping ring 10 that is of right-angle contour in cross-section and held in connection with said disk by screws 11 that extend through apertures in the diaphragm.

The disk and clamping ring together constitute the diaphragm-casing and the construction and arrangement of all the several parts above specified is similar to what is customary practice in the art to which my invention relates. It is also customary practice to attach the stylus-arms of graphophone and gramophone sound boxes to the diaphragm-casings thereof uninsulated therefrom. An important novel feature of my improved sound-box is an insulation of its stylus-arm from the diaphragm-casing, and another important feature of said box is

my peculiar way of attaching said arm to the diaphragm.

By further reference to the drawings, it is to be noted that a ring 12 of any suitable insulating-material surrounds the clamping-ring 10 of the sound-box on which it is held by a concentric clamping-band 13 having a flat faced outer lug 14, upon which to clamp a slotted and recessed spring-plate 15, the clamping-means being an outer bar 16 held in opposition to the plate by screws 17 engaging the lug of said band, the plate-slots affording clearance for the screws and permitting adjustment of said plate. The socket-end of a stylus-arm 18 extends through the recess of the spring-plate 15 and is provided with oppositely extending lateral wings 19 to which said plate is fastened by screws 20, the vibrations of the said arm being regulated by adjustment of the aforesaid plate between the band-lug 14 and clamping-bar 16. The socket-end of the arm 18 is provided with the usual set-screw 21 by which to detachably hold a stylus 22 in engagement therewith, and the other end of said arm is inturned and forked, the fork-branches being in connection with a plate 23 attached to the diaphragm 9, centrally of the same, by a screw 24, as best shown in Fig. 4, upon an enlarged scale. From the foregoing it is to be understood that the forked stylus-arm 18 is virtually a tuning-fork regulated as to pitch by the adjustment of the spring-plate to which it is connected in insulation from the diaphragm casing of the sound box as a whole.

By having the stylus-arm of the sound-box insulated from the diaphragm-casing and said arm forked and offset from the diaphragm immediately over the center of the same, the objects of my invention are attained.

I claim:

1. In a graphophone or gramophone sound-box, the combination of a casing, a diaphragm insulated therein, a ring of insulating material encompassing the casing, a clamping-band by which the insulating ring is held in place and which is provided with a flat faced outer lug, a recessed and slotted spring-plate facing the band-lug, a bar opposing the spring-plate, fastening screws extending through the bar and the spring-plate slots into said band-lug, a stylus-arm having the socket-end thereof fastened to said spring-plate and extended



through the recess of the same, the other end of the arm being an inturned fork; and a plate connected with the fork branches of said arm and attached to said diaphragm centrally of the same.

2. In a graphophone or gramophone sound-box, the combination of a casing, a diaphragm insulated therein, a ring of insulating material encompassing the casing, a clamping-band by which the insulating ring is held in place and which is provided with a flat faced outer lug, a recessed and slotted spring-plate facing the band-lug, a bar opposing the spring-plate, fastening screws extending through the bar and the spring-plate slots into said band-lug, a stylus-arm having the socket-end thereof pro-

vided with oppositely extending lateral wings held by screws in connection with said spring-plate through the recess of which said end of the arm extends, the other end of said arm being an inturned fork; and a plate connected with the fork branches of said arm and attached to said diaphragm centrally of the same.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee in the county of Milwaukee and State of Wisconsin in the presence of two witnesses.

ALBERT L. ROETHE.

Witnesses:

JOSEPH H. ANDRES,  
B. J. NOCKIN.

---

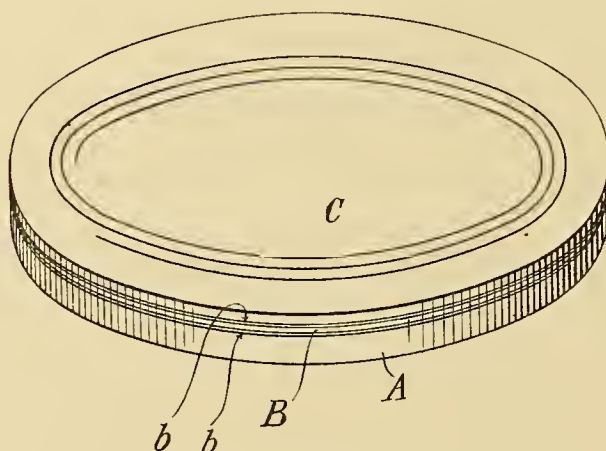
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



V. H. EMERSON.  
DISK SOUND RECORD.  
APPLICATION FILED JUNE 29, 1905.

1,113,973.

Patented Oct. 20, 1914.



Witnesses  
*Raphaël Heller*  
*R. L. Scott*

*Victor H. Emerson,*  
Inventor

By his Attorneys:  
*Mauro, Cameron, Lewis, & Marie*



# UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## DISK SOUND-RECORD.

1,113,973.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed June 29, 1905. Serial No. 267,589.

*To all whom it may concern:*

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of New York city, New York, have invented  
5 a new and useful Improvement in Disk Sound-Records, which improvement is fully set forth in the following specification.

This invention relates to the building up of a suitable tablet or disk that is to constitute the commerical sound-record. Broadly  
10 speaking this tablet consists of a main portion or body, a facing that contains the irregularities corresponding to the sound-waves, and an intermediate layer or stratum that  
15 serves the two-fold purpose of securing the facing to the main portion and of otherwise contributing (in a manner to be explained) to the production of the commercial sound-record.

20 In the drawing annexed hereto to illustrate an embodiment of my invention, I have shown the parts greatly exaggerated in thickness.

In carrying out my invention I take a  
25 sheet or disk A of cardboard or the like, as the body portion or base. I take a thin sheet of paper B and coat it on both sides with shellac, *b* and *b*. I then take a thin sheet of celluloid C, and place the three  
30 together (the shellac *b b* being between the cardboard and the celluloid). This composite sheet is then placed, celluloid downward, upon a sound-record matrix (of either the zig zag type or the vertically-undulating  
35 type) and the whole inserted into a suitable press. The matrix and the press having been warmed before pressure is applied, the former is caused to impress its irregularities into the celluloid. Upon the removal of the  
40 completed article it may then be finished in any desirable manner—as by waterproofing, etc.

The general object of the invention is to utilize as much as possible of comparatively  
45 inexpensive material for the tablet and as little as possible of the more expensive material to constitute the record-surface proper. Celluloid will not adhere to cardboard, consequently, some cement must be  
50 supplied for the purpose, and I prefer to use shellac. It has been found in practice that the surface of the metallic matrix (an elec-

troplate) is not an absolute true geometric plane, and neither is a cardboard disk, nor is the latter of absolute homogeneity through-  
55 out; consequently, some yielding medium should be interposed to compensate for these unavoidable departures from absolute true-ness. The shellac, when subjected to heat  
60 (of the press and matrix) and pressure, becomes yielding. Hence this intermediate layer of shellac serves the two-fold purpose of cementing the celluloid to the cardboard and of affording a yielding compensation  
65 so as to permit the production of the uniformly accurate sound-record.

The function of the thin paper B is merely to serve as a medium for presenting the shellac; consequently, this paper may be dis-  
70 pensed with and the shellac applied directly to the face of the cardboard or the celluloid or both, but in practice I prefer to use a thin sheet of paper coated on both sides with shellac. Of course, other gums or cements  
75 may be substituted for shellac, some equivalent for cardboard may be used and various modifications may suggest themselves to persons skilled in this art, without depart-  
80 ing from the spirit of my invention.

Having thus fully described my invention, I claim:

1. An impressed disk sound-record composed of a body of cardboard or the like, a facing of celluloid or the like containing the  
85 sound-record impressed therein, and a sheet of paper or the like interposed between the said body and the said facing, and the three secured together by shellac or the like.

2. A disk for sound-records composed of a body of cardboard or the like, a facing of  
90 celluloid or the like, and a sheet of paper or the like interposed between the two, and the three secured together by shellac or the like.

3. A sound record disk composed of a  
95 sheet of paper or the like coated on both sides with shellac or the like, a main portion or body of cardboard or the like secured to the shellac or the like on one side of said sheet, and a coating or surface of sound-  
100 record-receiving material secured to the shellac on the other side of said sheet.

4. A sound record disk composed of a sheet of paper or the like coated on both

sides with shellac or the like, a main portion or body of card-board or the like secured to one side of said sheet, and a coating or surface of sound-record-receiving material secured to the other side of said sheet.

5 5. A sound record tablet comprising a body portion consisting of a plurality of separate sheets of fibrous material united by an adherent under heat and pressure and a

surface portion consisting of a coating of 10 shellac-like record material.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

C. A. L. MASSIE,

R. L. SCOTT.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





T. H. MACDONALD.  
METAL SOUND RECORD.  
APPLICATION FILED MAY 14, 1910.

1,114,010.

Patented Oct. 20, 1914.

Fig. 1<sup>a</sup>

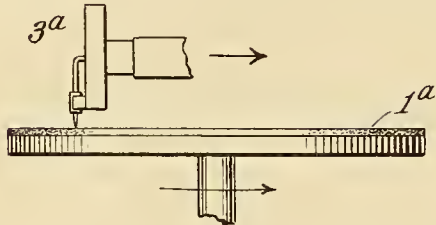


Fig. 1

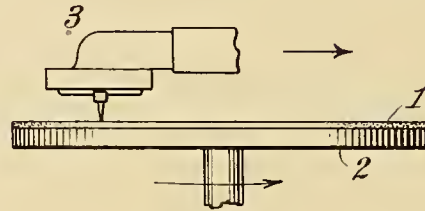


Fig. 2

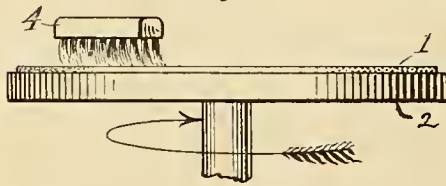


Fig. 3

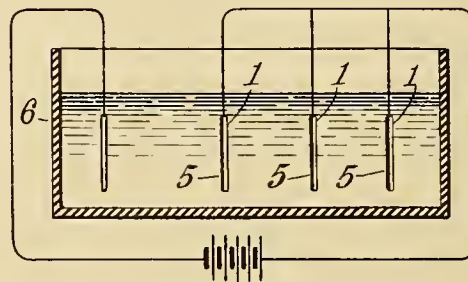


Fig. 6

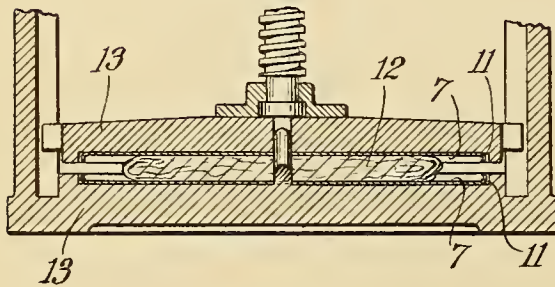


Fig. 4

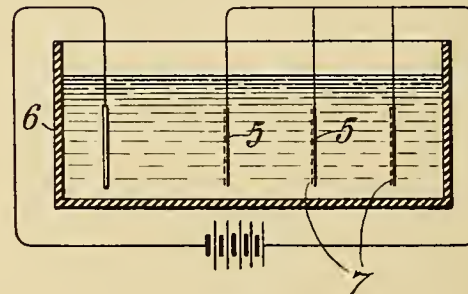


Fig. 7

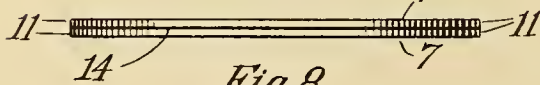


Fig. 8

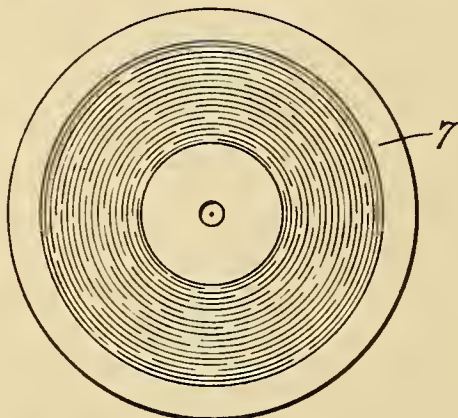
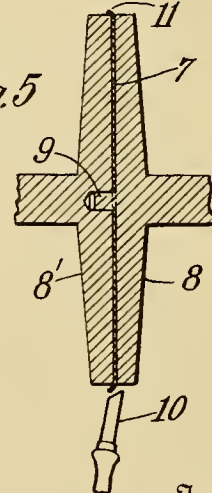


Fig. 5



Witnesses:  
M. A. Hood.  
Frederick A. Holton.

Inventor  
Thomas H. MacDonald  
By his Attorneys  
Neuro. Cameron & Macmillan

# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## METAL SOUND-RECORD.

1,114,010.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed May 14, 1910. Serial No. 561,311.

*To all whom it may concern:*

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Metal Sound-Records, which invention is fully set forth in the following specification.

The object of this invention is to produce a sound-record of greatly improved durability without any sacrifice of quality.

It is well known that with the sound-records now on the market each reproduction causes deterioration, and that after several hundred reproductions or sometimes even less the record becomes so poor as to be practically worthless. It has long been desired to obtain for permanent preservation records of celebrated personages, great singers, etc. Such records can be preserved for a long time, perhaps indefinitely; but each use thereof, for audible reproduction, to that extent tends to destroy them. By my invention I produce a permanent sound-record which can be used thousands of times without any appreciable deterioration, and which can be preserved for indefinite ages, yet without any sacrifice of quality.

My invention will be best understood by reference to the annexed drawings that illustrate preferred methods of procedure, the disks shown in the drawings being somewhat exaggerated in thickness for sake of clearness and the drawings themselves not being made to scale but merely as illustrations.

In the drawings Figure 1 is an elevation intended to represent conventionally the production of an "original" disk sound-record of the vertically-undulating type, and Fig. 1<sup>a</sup> is a similar view representing the production of an "original" disk sound-record of the laterally-undulating type; Fig. 2 is an elevation indicating the operation of rendering the surface of such "original" electro-conductive; Fig. 3 is a transverse vertical section through a conventional representation of an electro-plating bath for producing the electroplate masters or "negatives" of the "originals", and Fig. 4 is a similar view representing the production from such negatives of electroplate "positives"; Fig. 5 is a sectional view of a pair of rotating chucks, indicating the turning back of the circular edge or rim of such metal "positives"; Fig. 6 is a vertical sec-

tion through a press, representing the pressing-up of the double-faced sound-record; Fig. 7 is an edge view, and Fig. 8 a face view, representing the completed record.

Preferably the metallic record-surfaces are produced as follows: In Fig. 1, 1 represents a disk of wax-like material carried upon the revolving turn-table 2, while 3 indicates a recording-device traveling slowly across the face of the revolving tablet 1. The recorder is arranged with its diaphragm practically horizontal, so that its stylus vibrates up and down to produce in the surface of tablet 1 a spiral record-groove having vertical undulations corresponding to sound-waves,— a record-groove of the type disclosed in the Bell and Tainter Patent No. 341,214, May 4, 1886.

Referring to Fig. 1<sup>a</sup> as a modification, the slowly traveling recorder 3<sup>a</sup> has its diaphragm practically vertical, and its stylus vibrates laterally to produce in the tablet 1<sup>a</sup> a record-groove having lateral undulations or "zigzags" corresponding to sound-waves, as described in the Jones Patent No. 688,739, December 10, 1901. The surface of the original record 1 (or 1<sup>a</sup>) is then rendered electro-conductive in any well-known manner, as by coating it carefully with finely powdered graphite, which may be brushed over the revolving tablet 1, by means of a brush 4, as indicated in Fig. 2. Thereafter, a metallic reverse or negative 5 is obtained from the original, by electroplating in the well-known manner.

Fig. 3 represents conventionally a plating-bath 6 containing a number of originals 1 having an electrodeposited coating or metal plate 5 adhering to each. These electroplates 5 are separated from the originals, and present a reverse of the original sound-record; and this reverse-surface is preferably cleaned, nickel-plated (if of copper), and polished. From these reverse electroplates 5, positive metallic records are then obtained in any well-known manner, as by repeating the electroplating, which is illustrated by Fig. 4, which shows an ordinary plating-bath 6 containing a number of the metallic negatives 5 upon which the metallic positives 7 are being deposited by electrolysis in the well-known manner. These positives 7 are separated from the negatives 5, and present exact copies of the original records produced in the tablet 1. These



positive metal copies 7 will be preferably cleaned, nickel-plated (if of copper) and polished or buffed, to constitute the metallic record-surfaces of the finished article.

5 The object of the steps described in the preceding paragraph is to obtain metallic sound-records capable of audible reproduction upon the talking-machine. Although I have described the particular steps of first  
10 recording in a wax-like material and subsequently obtaining therefrom electroplates or "positives," my invention is not limited to the employment of that precise method or those particular steps, since any method by  
15 which metal sound-records are produced is within the particular spirit of the present invention. For instance, the separate metal sheets or records may be produced as disclosed in my Patent No. 836,646, granted  
20 Nov. 20, 1906. The metal records 7 are comparatively thin sheets of metal. The edge of each record is now turned backward and inward, as indicated by Fig. 5, in which 8—8' as indicated in Fig. 5 of the  
25 drawings represent two revolving circular heads or chucks, a little smaller in diameter than the metal disk 7. Each of the disks 7 is in turn centered between the two chucks, as by means of a stud 9 projecting from the  
30 center of one chuck and passing through a center hole in the disk 7 into a corresponding seat into the other chuck. 10 indicates a tool pressed against the protruding edge  
35 11 of the revolving metal disk 7, which is thereby bent as indicated. Assuming that the record-groove is on the right hand of the disk 7, as appearing in Fig. 5, then the edge 11 is flanged backward (to the left) in  
40 Fig. 5. And thereafter the extreme edge of this rim 11 is bent inward to produce a slight lip which may be accomplished by further use of a tool against the revolving  
45 edge of the rim. In cross-section this backward and inward bending of rim 11 would appear as a slight hook. See Fig. 6. Referring to Fig. 6, two of such metal records 7, preferably of different selections, are placed back to back, with their inturned  
50 rims 11—11 toward each other; and between the two is placed a lump or mass 12 of suitable material, preferably the thermo-plastic material or "stock" (earthy matter blended with shellac or other gum as a  
55 binder) employed in making ordinary disk records. The whole is then inserted between the jaws 13—13 of a suitable press, being preferably fitted in circular dies pro-

vided with circular depressions or seats; and the press is operated to compress the two metal disks together and squeeze the  
60 material 12. The pressure of the jaws 13—13 causes the thermo-plastic mass 12 to spread radially outward, until it abuts against the rims of the metal shells and their inturned lips; and thereupon the rims  
65 are forced outward by the oncoming material 12, until they assume the full cylindrical outline of the confining walls of the dies, by which time the rims 11—11 will have come together. More or less of the  
70 extreme inturned lip at the very edge of the rims will still remain for locking into the interposed material 12, which by this time will have resumed its normal hardness. The article so produced, shown in edge view  
75 by Fig. 7 and in face view by Fig. 8, appears to be a disk of metal; each face is of metal and the cylindrical edge is likewise of metal. The joint between the two rims 11—11 appears as an arrow (black) line 14. 80  
If desired the two record-surfaces of the finished article may be again cleaned and buffed, and the article is now ready for use.

My invention is not limited to the particular methods of forming metallic records  
85 shown and described, the limits of the invention being defined in the annexed claims.

Having thus described my invention, I claim:

1. As an article of manufacture, a double-  
90 faced disk sound-record consisting of two metallic surfaces each provided at its rear with an inturned lip, and a connecting layer of material that will spread under pressure uniting said lips. 95

2. A two part sound-record consisting of two metal shells each containing a sound-  
record on its face and an inturned lip at its rear, and non-metallic material that will  
100 spread under pressure uniting said lips. 100

3. A double-faced sound-record consisting of two metallic shells each having a  
sound-record on its face and having an inturned lip at its rear, and an interposed  
105 material that will spread under pressure engaging said lips and locking said shells together. 105

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,  
C. W. HEDBERG.





A. H. LEISSING.  
 PHONOGRAPH ATTACHMENT.  
 APPLICATION FILED NOV. 29, 1913.

1,114,492.

Patented Oct. 20, 1914.

Fig. 1.

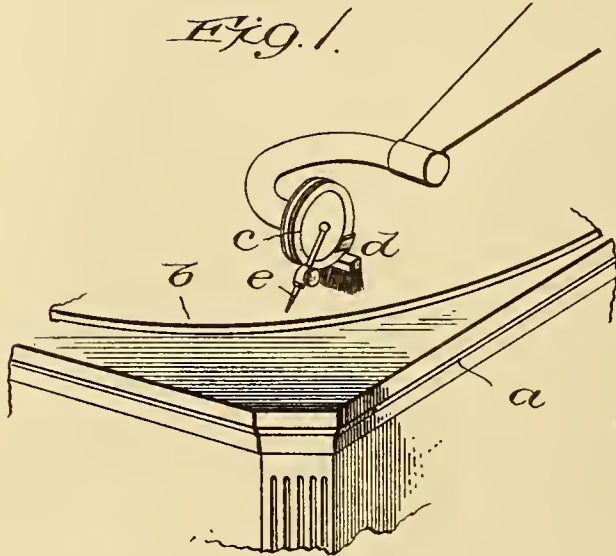


Fig. 2.

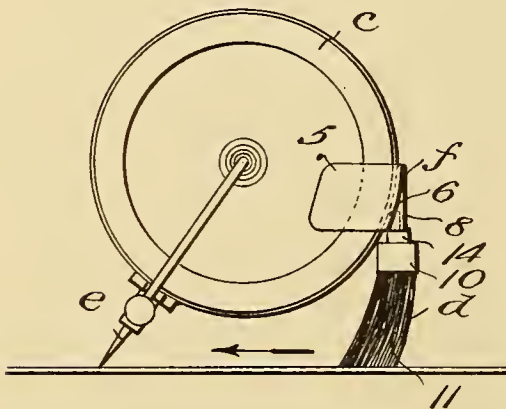


Fig. 4.

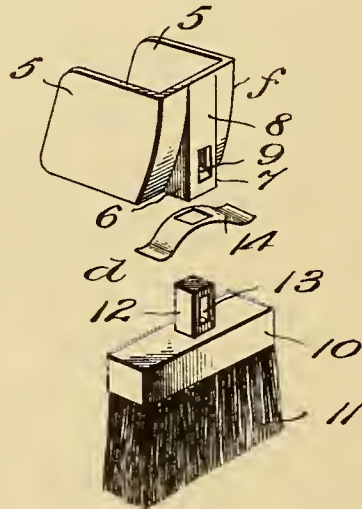


Fig. 3.

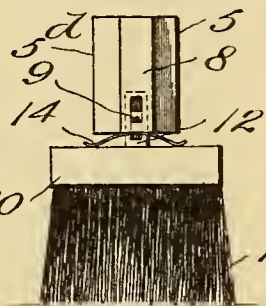
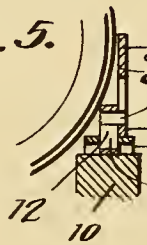


Fig. 5.



Inventor

Albert H. Leissing

By Victor J. Evans

Attorney

Witnesses

James Cronin  
 M. E. Laughlin

# UNITED STATES PATENT OFFICE.

ALBERT H. LEISSING, OF NEW YORK, N. Y.

## PHONOGRAPH ATTACHMENT.

1,114,492.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed November 29, 1913. Serial No. 803,762.

*To all whom it may concern:*

Be it known that I, ALBERT H. LEISSING, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented new and useful Improvements in Phonograph Attachments, of which the following is a specification.

The general object of the invention is to effect the removal of particles of dust, dirt or the like, from the grooves or indentations of the surface of a sound record. And to this end the invention resides in providing a cleaner in the form of a brush and in adapting the brush to connect with any desirable portion of the phonograph, such as the diaphragm casing, and in adapting the connecting part of the brush to hold the brush in contact with the surface of the sound record when the said connecting part is attached to the phonograph.

Other objects will appear and be better understood from that embodiment of my invention of which the following is a specification, reference being had to the accompanying drawings forming part hereof, in which:

Figure 1 is a perspective view of a portion of a phonograph showing my improved device connected to the diaphragm casing. Fig. 2 is an enlarged detail side elevational view of the diaphragm casing and showing my improved device connected thereto. Fig. 3 is a rear elevational view of my improved device. Fig. 4 is a detail perspective view of the device showing the parts separated. Fig. 5 is a detailed sectional view of the connection between the brush handle and the pocket.

In the drawings *a* indicates a fragment of the casing of a phonograph, *b* the sound record and *c* the casing for the diaphragm.

*d* indicates generally the invention which is herein shown as connected to the casing *c* and arranged with such relation to the direction of rotation of the sound record *b*, as to be in advance of the stylus or reproducer *e*.

In the present embodiment the attachment is shown as used in connection with a disk sound record and a machine arranged to take such disk, but this is simply illustrative and from what will hereinafter appear it will be readily understood that the invention may be used with other types of

sound records and machines adapted for use with these.

The clip forming one part of the subject-matter of the present invention and herein indicated generally by *f*, is preferably formed of resilient metal and comprises the jaws 5—5. These jaws are in spaced relation and the distance between them is in such relation to the thickness of the casing *c* as to effect the further spreading of the jaws during the act of adjusting the clip onto the casing *c*, which is done by presenting the edge of the casing to the space between the jaws and forcing the clip over the casing, whereby to have the jaws frictionally bind on the opposite faces of the casing and thereby support the clip against accidental displacement. The jaws are connected together by the walls 6 and 7 of a pocket 8. This pocket 8 is open at its lower end and it is interiorly provided with a cross piece 9 in the form of a lug which extends transversely of the pocket.

10 indicates a brush stock which is equipped with relatively soft bristles 11. The brush stock is also provided with a vertically disposed handle 12 adapted for insertion into the pocket 8 and having an oblong opening 13 adapted for receiving the cross piece 9. The presence of the cross piece in the oblong opening 13 effects the suspending of the brush and when the brush is so suspended and the clip so adjusted on the casing *c* as to permit of contact between the end of the brush and the sound record, the surface of the record will be swept as the said surface passes under the brush. The presence of a spring 14 interposed between the pocket and the stock and herein shown in the form of a bow-spring and provided with an opening to receive the handle 12, operates to exert such pressure on the brush as will cause the bristles thereof to penetrate the grooves and indentations on the surface of the record.

Obviously with this construction and when the brush is arranged as shown in the drawings and the record rotating in the direction of the arrow, the surface thereof will be cleared of all foreign matter prior to moving into contact with the stylus. Consequently full efficiency of the record will be had by consequence of the removal of foreign material in the indentations of the record.



To assemble the parts the handle 12 is inserted through the opening in the spring 14 and the spring 14 is then pressed out against the brush stock 10. The handle 12 is then inserted in the pocket 8 and the cross piece 9 is passed through the registering opening in the pocket 8 and the opening 13 and then the brush stock is released whereby the spring draws the cross piece down against the bottom of the opening in the pocket 8 and against the upper end of the opening 13.

What is claimed as new is:

1. In combination, a clip formed with a pair of resilient jaw members arranged in spaced relation, a pocket located between the

jaws, a support located in the pocket, and a brush located in the pocket and slidingly fitted on the support.

2. In combination, a clip formed with a pair of resilient jaw members arranged in spaced relation, a pocket located between the jaws, a support located in the pocket, and a brush located in the pocket and slidingly fitted on the support, and yieldingly held against movement in one direction.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT H. LEISSING.

Witnesses:

GEO. A. BYRNE,

M. E. LAUGHLIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



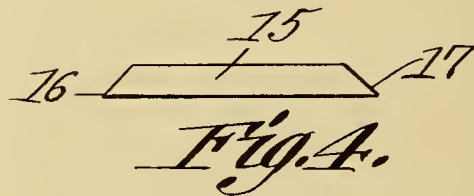
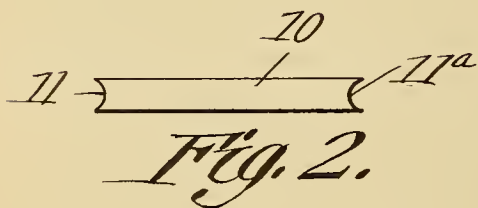
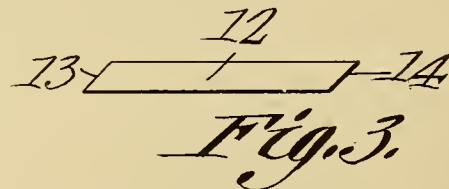
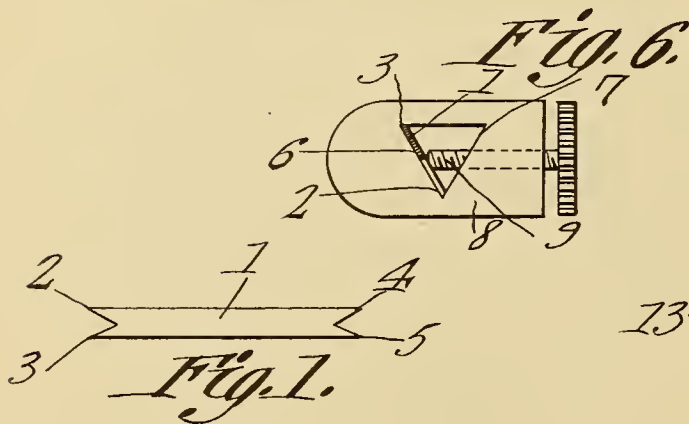
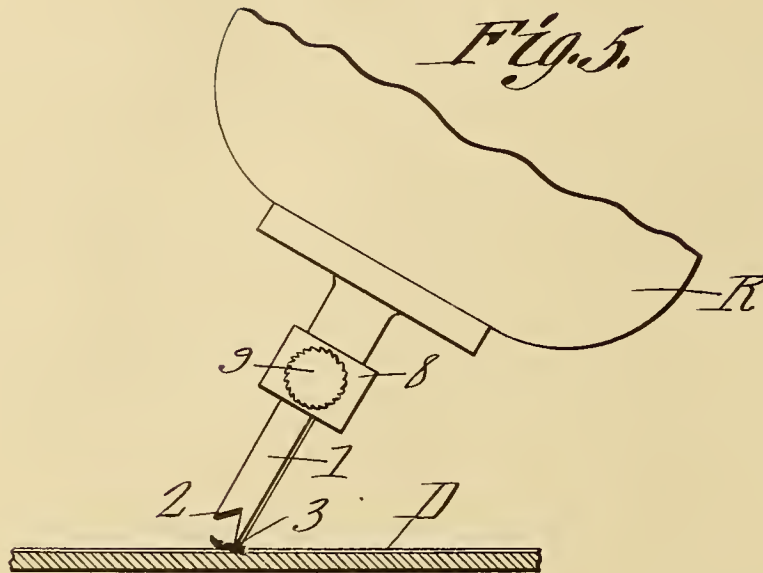
S. LEVIN.

STYLUS.

APPLICATION FILED JUNE 30, 1913.

1,114,493.

Patented Oct. 20, 1914.



*S. Levin,*

Witnesses

*J. R. Dumein*  
*S. Willard.*

Inventor

by

*Chas. Snow & Co.*

Attorneys



# UNITED STATES PATENT OFFICE.

SAMUEL LEVIN, OF HIGHLAND PARK, ILLINOIS.

## STYLUS.

1,114,493.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed June 30, 1913. Serial No. 776,672.

*To all whom it may concern:*

Be it known that I, SAMUEL LEVIN, a citizen of the United States, residing at Highland Park, in the county of Lake and State of Illinois, have invented a new and useful Stylus, of which the following is a specification.

The present invention relates to an improved stylus, especially adapted to be used in connection with disk sound reproducing machines, one object of the invention, being the provision of a stylus, which being made of resilient material, which is rectangular in cross section, will not unduly scratch the sound grooves of the record and which will be provided with a plurality of groove engaging points, so that the life of the stylus will be greatly increased, as will also the life of the record.

A further object of the invention is the provision of a flat resilient stylus, which may be composed of any material, either metal, fiber, wood, celluloid or in fact any material that will answer the purpose, the opposite ends of the same being provided either with a plurality of groove engaging points or a single groove engaging point, so that the same may be readily attached to the usual form of reproducer used in connection with disk sound reproducing machines, the same being disposed at an angle to the sound groove, and the rotation thereof, so as to resiliently support the sound reproducer and thus reduce the wear upon the record, such stylus when having more than one point upon each end, being disposed at such angle, that only one point is in engagement with the sound record groove, while the other point is elevated thereabove.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings Figure 1 is a plan view of one form of stylus made according to and embodying the present invention. Figs. 2, 3, and 4 are plan views of modified forms of stylus embodying the present invention. Fig. 5 is a diagrammatic view of a

reproducer, and a portion of a disk record with the stylus as shown in Fig. 1 in operable relation thereto. Fig. 6 is a bottom plan view of the stylus receiving member of the reproducer showing the position the stylus is held in when clamped thereto.

Referring to the drawings, and particularly to Figs. 1, 5 and 6 thereof, the stylus 1 is composed of a flat strip of material, rectangular in cross-section, and has its ends cut or grooved so as to provide the four record groove engaging points 2, 3, 4 and 5. It will thus be seen that this stylus is provided with two record engaging points upon each end thereof, and that such stylus is readily insertible within the triangular stylus receiving socket 7 of the stylus clamping member 8, so that the stylus 1 when in proper clamping position will rest against one inclined wall 6 and be held thereagainst, as shown in Fig. 6 by means of the locking screw 9. It is therefore apparent that when the stylus is in the clamp, as clearly shown in Figs. 5 and 6, that one point as 3 will be placed in engagement with the groove of the disk D, while the point 2 upon the same end of the stylus due to the inclining of the reproducer R and the angle at which the body of the stylus 1 is presented to the disk, will be elevated above the surface of the disk and thus held out of contact therewith. It is also evident that the body of the stylus is presented at an angle to the groove of the record D, so that a slight flexing of the body thereof is permitted, such flexing forming a resilient support for the reproducer R, so that no undue strain is placed upon the portion of a sound record engaged by the point 2, such resilient action reducing the friction to prevent undue wear at such point.

It is apparent that many forms of styli embodying the present invention may be provided, and as particularly shown in Fig. 2, the opposite ends of the stylus 10 are provided with a curved recess 11—11<sup>a</sup> to provide four points as in the structure shown in Fig. 1.

In Fig. 3, the flat stylus 12 is provided with the parallel cut ends 13 and 14, being at an angle to the body of the stylus, such cutting of the ends providing two points instead of four upon the stylus and thus providing a double wear.

In the form shown in Fig. 4, the stylus 15 has its opposite ends 16 and 17 cut so



as to present two record engaging points at the same edge of the stylus, thus in another manner providing two points one upon each end of the body of the stylus.

5 In all of the forms herein illustrated, the stylus will be positioned and properly connected in the clamping member 8, as clearly shown in Figs. 5 and 6, so that the resilient action of the stylus due to the weight of  
10 the reproducer thereupon and the angle of the presentation of the body of the stylus to the record D, will prevent any undue wear upon the record, and as each stylus is provided with two or more record engag-  
15 ing points, it is evident that the durability of the stylus is increased over the usual needle employed.

What is claimed is:

1. The combination with a reproducer  
20 having a stylus receiving clamp provided with a triangular socket, of a stylus composed of a flat relatively thin strip of resilient material disposed against one wall of the socket of the clamp so that the body  
25 thereof is disposed at an acute angle to the path of the sound grooves of a record, and whereby the reproducer is resiliently supported by the stylus.

2. The combination with a reproducer  
30 having a stylus receiving clamp provided with a triangular socket, of a stylus composed of a flat relatively thin strip of resilient material disposed against one wall of the socket of the clamp so that the body  
35 thereof is disposed at an acute angle to the path of the sound grooves of the record, and whereby the reproducer is resiliently supported by the stylus, the opposite ends of said strip each being provided with a  
40 record engaging point.

3. The combination with a sound reproducer having a stylus receiving clamp provided with a triangular socket, of a stylus

composed of a flat relatively thin strip of resilient material disposed within the socket 45 of the clamp, whereby the body of the stylus is held co-extensive with one wall of the socket to be disposed at an acute angle to the path of the sound groove of the record and forms a resilient support for the re- 50 producer.

4. The combination with a sound reproducer having a stylus receiving clamp provided with a triangular socket, of a stylus composed of a flat relatively thin strip of 55 resilient material mounted within the socket of the clamp, whereby the body of the stylus is held co-extensive with one wall of the socket to be disposed at an acute angle to the path of the sound groove of a record 60 and forms a resilient support for the reproducer, the opposite ends of said stylus, each being provided with a record groove engaging means.

5. The combination with a sound repro- 65 ducer having a stylus receiving clamp provided with a triangular socket, of a stylus composed of a flat relatively thin strip of resilient material mounted within the socket of the clamp, whereby the body of the stylus 70 is held co-extensive with one wall of the socket to be disposed at an acute angle to the path of the sound groove of a record and forms a resilient support for the reproducer, the opposite ends of the stylus, 75 each being provided with a plurality of points for engagement one at a time with the sound groove of a record.

In testimony that I claim the foregoing as my own, I have hereto affixed my signa- 80 ture in the presence of two witnesses.

SAMUEL LEVIN.

Witnesses:

THOMAS M. DOOLEY,  
FLORENCE McNEILL.

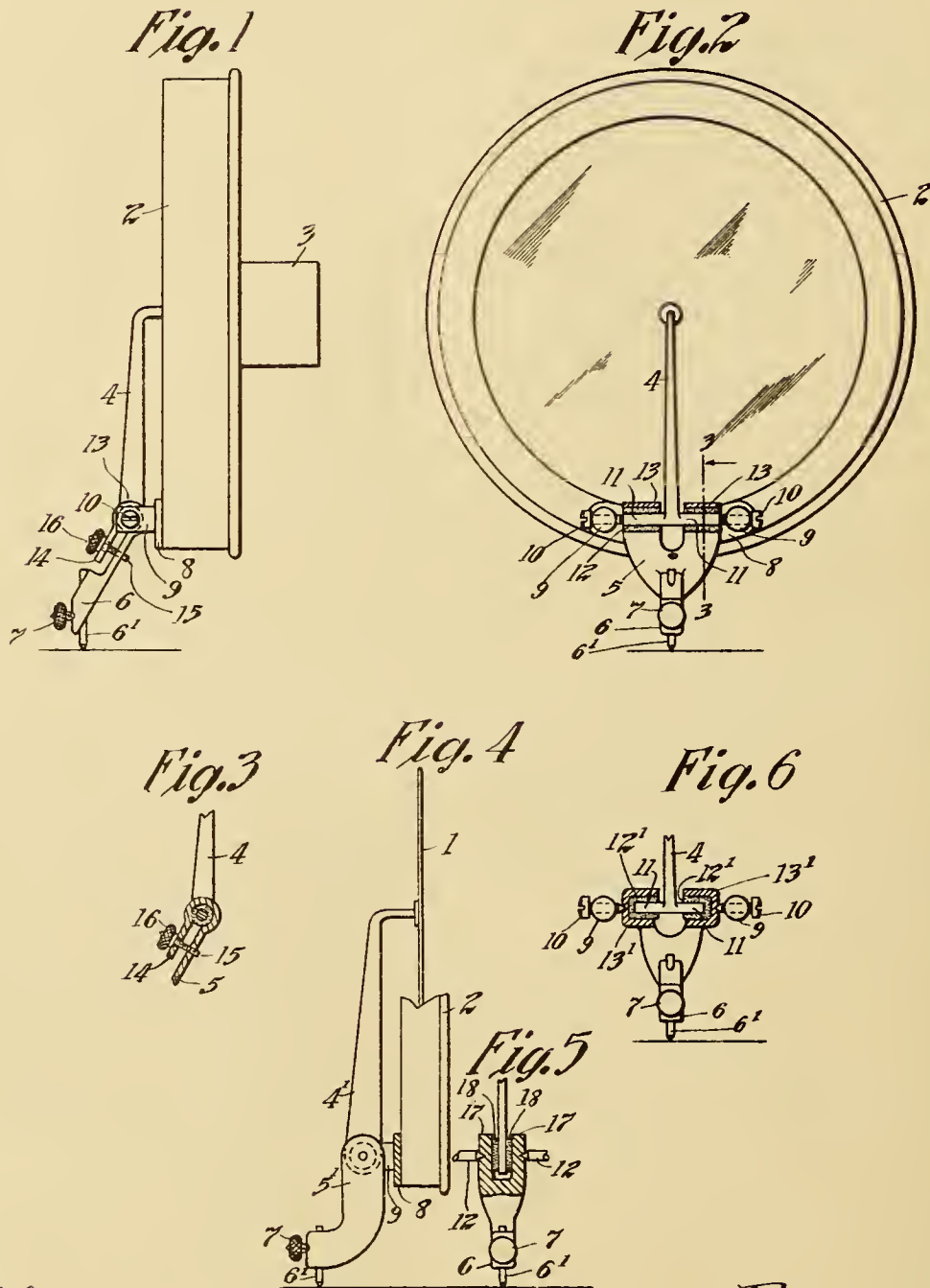




J. W. AYLSWORTH.  
SOUND BOX.  
APPLICATION FILED APR. 20, 1911.

1,115,374.

Patented Oct. 27, 1914.



*Witnesses:*  
*Edw. Dressler*  
*Frederick Bachmann*

*Inventor:*  
*Jonas W. Aylsworth*  
*by Frank L. Allen*  
*his Atty.*

# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-BOX.

1,115,374.

Specification of Letters Patent.

Patented Oct. 27, 1914.

Application filed April 20, 1911. Serial No. 622,412.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and usefu Improvements in Sound-Boxes, of which the following is a description.

My invention relates to sound boxes particularly of the type adapted for use in connection with disk records having vertically undulating grooves, although its use is not limited to that type.

With reproducers commonly in use, the tracking of the record groove by the stylus causes the emission of minute scratch vibrations which greatly impair the quality of the reproduction. It has also been found that when the stylus is rigidly connected with the diaphragm excessive loudness is given to some of the vibrations.

It is the principal object of my invention to provide a sound box free from these objections; and in conformity with this object, I provide a composite stylus arm having interposed between the sections thereof an elastic yielding substance which will absorb the minute scratch vibrations and which will at the same time retard or dampen the excessively loud vibrations.

Another object of my invention is to provide adjusting means whereby the loudness of the record may be modified and variations in the set of the diaphragm compensated for.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawings forming a part of this specification, and in which—

Figure 1 represents a side elevation of a sound box embodying my invention; Fig. 2 represents a front elevation thereof, the connection between the two sections of the stylus arm being shown in central longitudinal section; Fig. 3 represents a fragmentary sectional view taken on the line 3—3 of Fig. 2; Fig. 4 represents a fragmentary side elevation partly in section of a modification; Fig. 5 represents a front elevation partly in section of the stylus arm shown in Fig. 4; and Fig. 6 represents a similar view of still another form of stylus arm.

In all the views like parts are designated by the same reference numerals.

Referring to the drawings, the diaphragm 1 is mounted in any suitable way in the casing or support 2, the latter being provided with a rearwardly extending hollow neck 3 adapted to be connected with any suitable sound conveyer. Connected to the diaphragm substantially centrally thereof is a composite stylus arm having an upper section 4 and a lower section 5, the latter being provided with a socket 6 adapted to receive a stylus 6'. A set screw 7 serves as a means for securing the stylus 6' in place in the socket 6. For pivoting the stylus arm to the support, a bracket 8 provided with forwardly extending parallel lugs 9 is secured in any suitable manner to the casing 2, the lugs 9 being each provided with a threaded aperture in which is adjustably mounted a pivot screw 10. These screws are located in alinement with each other and are adapted to pivotally support the stylus arm in a manner that will be hereinafter more fully set forth. To obtain the best results, the diaphragm should be made rather sensitive and the arm of lightest weight consistent with proper rigidity.

In the form of my invention shown in Figs. 1, 2 and 3, the section 4 of the stylus arm has approximately the shape of an inverted T, the laterally extending arms 11 thereof being cylindrical in shape and being surrounded by cylindrical bushings 12 of rubber, cork, felt, or other suitable elastic yielding material. The lower section of the stylus arm has approximately the shape of a Y, the upper portion of the said section being curved back upon itself to provide cylindrical sockets 13 respectively engaging the outer surfaces of the corresponding bushings 12, and extending thence into a lip 14 parallel to the body of the section 5. The vertical portion of the member 4 is located in the space between the inclined arms of the member 5. In order to secure the sections of the stylus arm in proper relative adjustment, a set screw 15 is provided, this screw passing loosely through the lip 14 into threaded engagement with section 5, and being provided with a knurled head 16 engaging the outer surface of the lip 14 and serving as means to rotate the said screw. The adjustable pivots 10 are located in aline-



ment with the axes of the arms 11 and engage the other ends of said arms to pivotally support the stylus arm. The composite arm described above normally vibrates as a whole, the vibrations being transmitted through the yielding or elastic bushings 12 to the diaphragm. During such vibration, however, the objectionable minute scratch vibrations are absorbed and the excessively loud vibrations are dampened by the bushings 12. By adjusting the set screw 15, the loudness of the reproduction may be regulated and variations in the set of the diaphragm may be compensated for.

15 In the modification shown in Figs. 4 and 5, the lower portion of the upper section of the stylus arm is provided with flat lateral faces located between the parallel arms or lugs 17 of the lower section 5'. A flat piece of elastic yielding material such as cork, rubber or felt is interposed between the inner surface of each of the arms 17 and the opposing face of the section 4', the pieces 18 serving to yieldingly secure the sections 4' and 5' together. The pivots 12 engage the outer lateral surfaces of the lugs 17 to pivotally support the stylus arm. The operation of this modification is similar to that of the form of my invention shown in Figs. 1, 2 and 3.

30 The modification shown in Fig. 6 differs from that shown in Figs. 1, 2 and 3 in the employment of cup-shape bushings 12' and sockets 13' in place of cylindrical bushings 12 and sockets 13 shown in Figs. 1, 2 and 3. The bushings 12' surround the ends of the arms 11 respectively and are closely surrounded or inclosed by the sockets 13'; so that the sections of the stylus arm are held together with sufficient firmness to normally cause the vibrations of the arm as a whole, but to permit the bushings 12' to absorb the objectionable scratch vibration and to dampen the excessively loud vibrations. In this modification, the pivots 10 engage the outer closed ends of the sockets 13'.

It is to be noted that in all of the forms of my invention herein disclosed, the sections of the stylus arm are entirely out of contact with rigid portions of each other; so that during the relative movement of the sections, no scratch or other harsh vibrations are set up by friction or impact between the sections.

55 While I have shown certain preferred embodiments of my invention, numerous changes may be made therein without departing from the spirit of my invention; and I wish, therefore, not to be limited to the exact details shown and described.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:—

1. In a sound box, the combination of vibratory means, a support therefor, a stylus

arm connected with said vibratory means, said arm having a plurality of movably connected sections, yielding means interposed between said sections, and means for regulating the pressure of said sections on said yielding means, substantially as described. 70

2. In a sound box, the combination of vibratory means, a support therefor, a stylus arm pivoted to said support and connected with said vibratory means, said arm having a plurality of pivotally connected sections, yielding means interposed between said sections, and means for regulating the pressure of said sections on said yielding means, substantially as described. 75 80

3. In a sound box, the combination of vibratory means, means for supporting the same and a stylus arm connected with said vibratory means, the said arm having a plurality of sections provided with means for connecting the same, the said last named means comprising a pivot, a socket therefor provided with a bushing of yieldable material, and means for regulating the pressure between said socket, bushing and pivot, substantially as described. 85 90

4. In a sound box, the combination of vibratory means, a support therefor, and a stylus arm pivoted to said support and connected with said vibratory means, said arm having a plurality of sections provided with means for connecting the same, the said last named means comprising a pivot, a socket therefor provided with a bushing of yieldable material and means for regulating the pressure between said socket, bushing and pivot, substantially as described. 95 100

5. A stylus arm having a plurality of sections provided with means for connecting the same, the said means comprising a pivot, a socket therefor having a bushing of yieldable material and means for regulating the pressure between said socket, bushing and pivot, substantially as described. 105

6. In a sound box, the combination of a diaphragm, means supporting the same, and a stylus arm pivoted to said supporting means for oscillation about a given axis, said arm having a plurality of sections movable relatively to each other about said axis, and yielding means interposed between said sections, substantially as described. 110 115

7. In a sound box, the combination of a diaphragm, means supporting the same, a stylus arm pivoted to said supporting means for oscillation about a given axis, said arm having a plurality of yieldingly connected sections movable relatively to each other about said axis, substantially as described. 120

8. In a sound box, the combination of a diaphragm, means supporting the same, a stylus arm pivoted to said supporting means for oscillation about a given axis, said arm having a plurality of sections movable relatively to each other about said axis, yielding 125 130



means interposed between said sections, and means for regulating the compression of said yielding means between said sections, substantially as described.

5 9. A stylus arm comprising a plurality of pivotally connected sections, yielding means interposed between said sections, and means for regulating the compression of said yielding means between said sections, one of said  
10 sections being adapted for connection with the center of the diaphragm and another being adapted to support a stylus, substantially as described.

15 10. A stylus arm comprising a plurality of pivotally connected sections entirely out

of contact with rigid portions of each other, yielding means interposed between said sections, and means for regulating the compression of said yielding means between said sections, one of said sections being adapted 20 for connection with the center of the diaphragm and another being adapted to support a stylus, substantially as described.

This specification signed and witnessed this 18th day of April 1911.

JONAS W. AYLSWORTH.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHNN.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





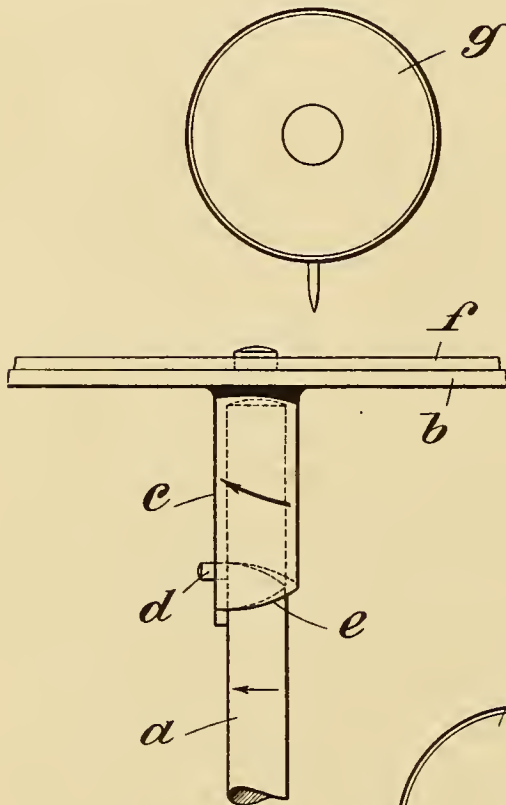


M. MARCUS.  
DISK TALKING MACHINE.  
APPLICATION FILED JUNE 10, 1914.

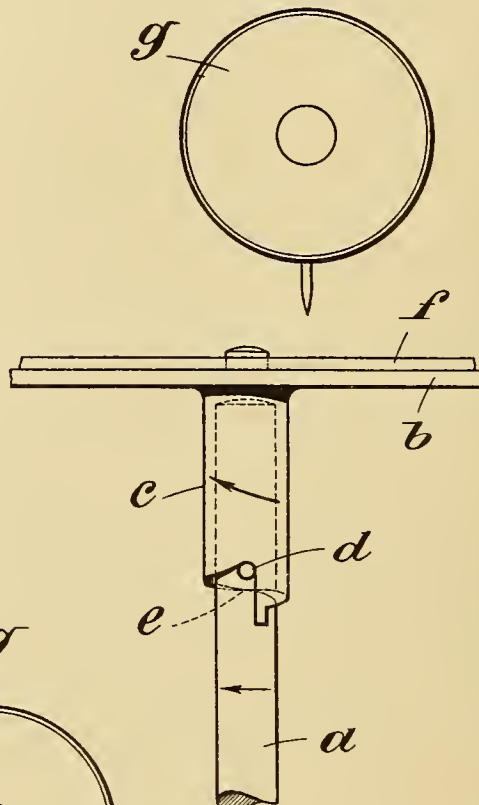
1,115,707.

Patented Nov. 3, 1914.

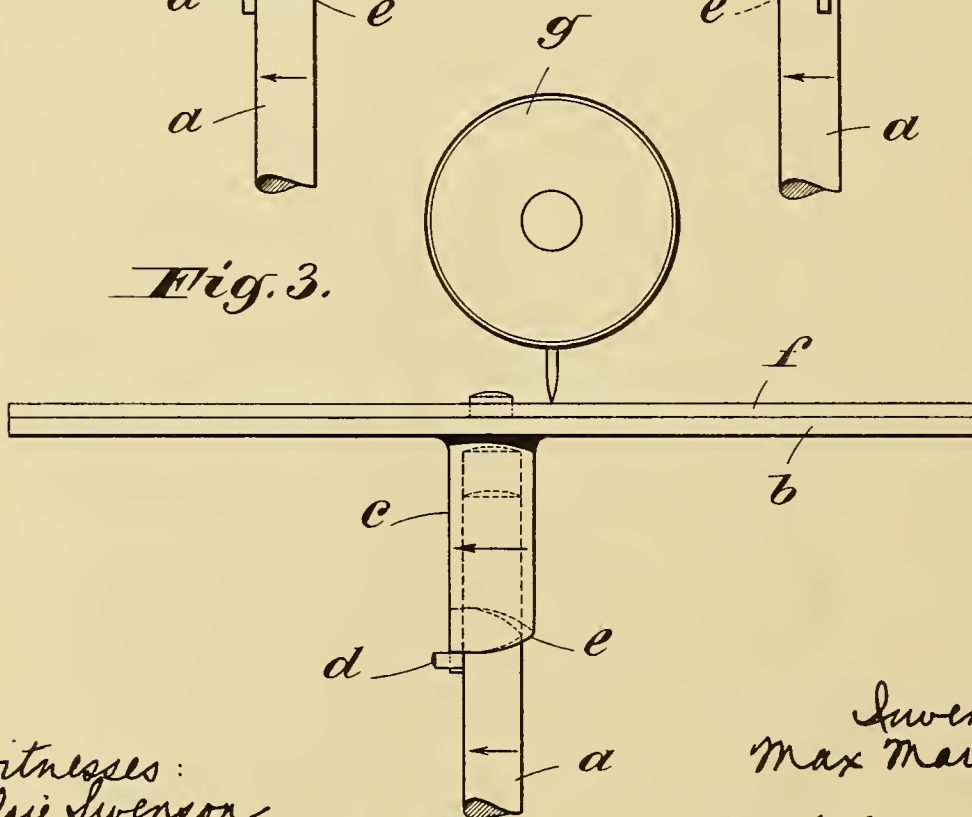
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses:  
Eli Swenson  
Ray J. Ernst

Inventor:  
Max Marcus  
by *Amos*  
Attorneys

# UNITED STATES PATENT OFFICE.

MAX MARCUS, OF PANKOW, NEAR BERLIN, GERMANY.

## DISK TALKING-MACHINE.

1,115,707.

Specification of Letters Patent.

Patented Nov. 3, 1914.

Application filed June 10, 1914. Serial No. 844,219.

*To all whom it may concern:*

Be it known that I, MAX MARCUS, of Pankow, near Berlin, a subject of the King of Prussia, and whose post-office address is 42 Tirolerstrasse, Pankow, near Berlin, Kingdom of Prussia, German Empire, have invented new and useful Improvements in or Relating to Disk Talking-Machines, of which the following is a specification.

This invention relates to disk talking machines such as gramophones and the like and has for its object to provide an apparatus whereby the needle or like member carried by the sound box is automatically brought into operation instead of being moved by hand or by some separate mechanism as heretofore.

A further object of this invention is to insure the needle always engaging the record smoothly without employing any additional mechanism and to effect disengagement between the needle and the record as soon as the main driving spindle ceases to rotate.

According to this invention the turn-table is so mounted on its spindle that the starting or stopping of the latter automatically moves the turn-table into or out of its operative position and also causes the rotation of the turn-table to be started or stopped gradually. To this end the turn-table is mounted on its spindle so as to rotate relatively thereto within certain limits and the driving engagement between the spindle and the turn-table is effected through a cam surface. When the spindle is at rest the turn-table occupies a plane below that in which it rotates during operation of the machine, the inertia of the turn-table relatively to the spindle and the cam surface causing the turn-table to be gradually rotated to the same speed as the spindle and simultaneously raised into engagement with the sound reproducing needle. When the record is completed and the driving mechanism is stopped the turn-table and the record it carries descend vertically relatively to the spindle and thus are moved out of engagement with the needle owing to the momentum of the turn-table. In this way the turn-table is automatically returned to its initial position without any danger to the surface of the record which remains intact.

In the accompanying drawings, Figure 1 shows in front elevation diagrammatically the turn-table and spindle in their inopera-

tive position. Fig. 2 is a side elevation also in the position of rest, and Fig. 3 shows the turn-table in operation.

In the construction illustrated, on the spindle *a* of the main driving mechanism the turn-table *b* is loosely mounted by means of a sleeve *c* connected to the underside of the turn-table. In the position of rest the sleeve bears against a pin *d* formed on the spindle *a* or against some equivalent stop. The lower end of the sleeve *c* constitutes a cam surface *e* terminating in a driver, and on the spindle *a* being rotated the turn-table is raised from its inoperative position by the pin engaging the curve. The turn-table remains in this position until, on the main driving gear being disconnected or stopped, the spindle *a* ceases to rotate whereupon the turn-table owing to its momentum and weight gradually descends, thus moving the record out of contact with the needle so that the latter can be returned either by hand or automatically to its initial position without any risk of damage to the record surface. It is merely necessary to provide some suitable stop or abutment to prevent the sound box ever occupying a plane as low as that in which the record lies when at rest.

It will thus be seen that unlike previous apparatus it is possible to exchange records without raising the sound arm or sound box.

It will be appreciated that a cam groove if desired may be formed in the spindle and a pin project into this groove from the sleeve and that the actual form of cam mechanism may vary considerably without departing from this invention.

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is:—

1. In a disk talking machine the combination of a rotatable spindle, a turn-table mounted thereon and driving means between the spindle and the turn-table whereby the rotary motion of the spindle is gradually imparted to the turn-table and a relative vertical motion is given to said turn-table when the spindle is started or stopped.

2. In a disk talking machine the combination of a rotatable spindle, a turn-table mounted thereon, a driving member on the rotatable spindle and an inclined or cam surface on the turn-table coöperating with such driving member for the purpose set forth.

3. In a disk talking machine rotatable

spindle, a turn-table mounted thereon and rotatable relatively thereto within certain limits and means whereby, on the starting or stopping of the spindle, the turn-table is  
5 caused to move vertically relatively to the spindle into or out of its operative position.  
4. In a disk talking machine the combination of a rotatable spindle, a turn-table, a socket attached to such turn-table and  
10 adapted to fit easily over said rotatable spindle, a cam surface at the lower end of said socket, steps or engaging members at the

ends of the cam surface and a pin on the rotatable spindle adapted to engage with the cam surface and the steps thereof substantially as set forth. 15

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MAX MARCUS.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



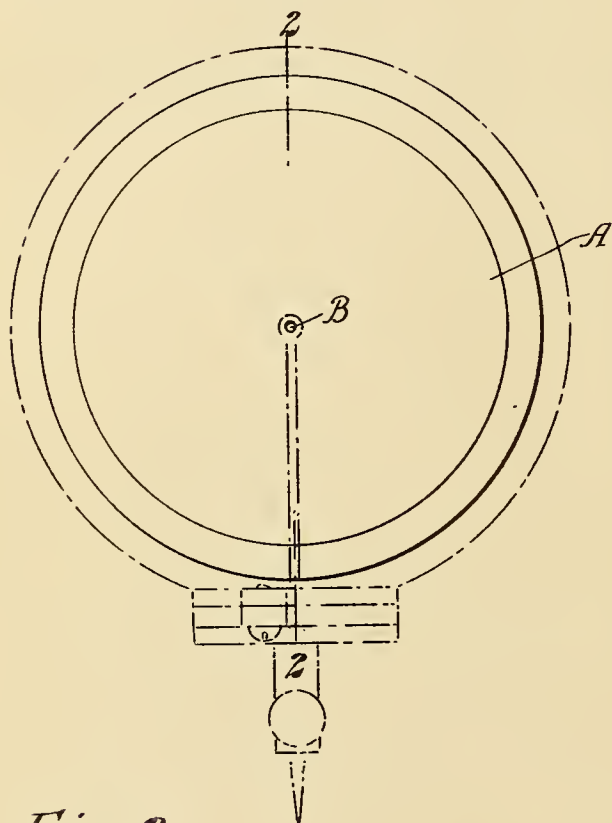


F. W. THOMAS.  
 DIAPHRAGM FOR SOUND REPRODUCERS.  
 APPLICATION FILED MAR. 11, 1913.

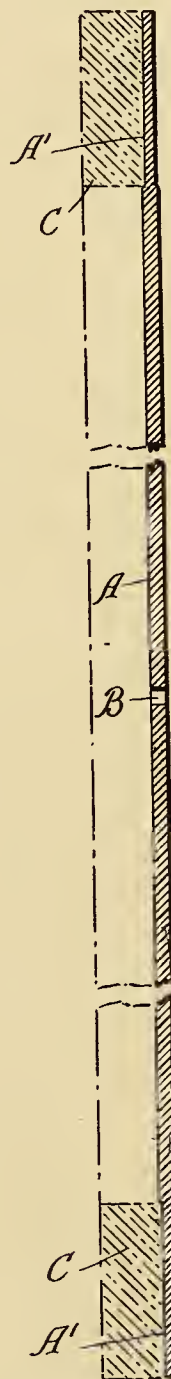
1,116,165.

Patented Nov. 3, 1914.

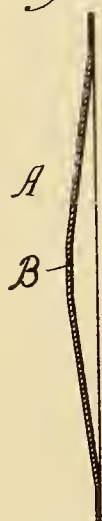
*Fig. 1,*



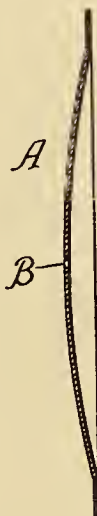
*Fig. 2,*



*Fig. 3,*



*Fig. 4.*



WITNESSES

*Edward Thorpe*  
*Geo. H. Foster*

INVENTOR

*Frederic W. Thomas*

BY

*Mumford & Co.*

ATTORNEYS

# UNITED STATES PATENT OFFICE.

FREDERIC W. THOMAS, OF NEW CITY, NEW YORK.

## DIAPHRAGM FOR SOUND-REPRODUCERS.

1,116,165.

Specification of Letters Patent.

Patented Nov. 3, 1914.

Application filed March 11, 1913. Serial No. 753,476.

*To all whom it may concern:*

Be it known that I, FREDERIC W. THOMAS, a citizen of the United States, and a resident of New City, in the county of Rockland and State of New York, have invented a new and Improved Diaphragm for Sound-Reproducers, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved diaphragm for sound reproducers such as are used in gramophones, graphophones, receivers and transmitters of telephones and other sound-reproducing instruments and machines and which is exceedingly sensitive for the reproduction of sound vibrations.

In order to accomplish the desired result use is made of a diaphragm of metal made exceedingly dense or compact throughout by pounding, beating, pressing, hammering or similar processes.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a face view of the diaphragm as applied to a graphophone sound box shown in dotted lines; Fig. 2 is an enlarged cross section of the diaphragm on the line 2—2 of Fig. 1, and showing in dotted lines the ring for compacting the peripheral edge of the diaphragm; and Figs. 3 and 4 are cross sections of diaphragms of different shapes.

The diaphragm A is made of suitable metal, and its texture is rendered exceedingly dense or compact throughout by pounding, beating, pressing, hammering or similar processes, wherein the pressure is applied perpendicularly or normally to the plane or final surface of the diaphragm. In practice, according to one method a blank, preferably of disk shape, is cut from a piece of sheet metal and this disk is then subjected to a pressure other than rolling, as pounding, beating, pressing, hammering or similar action to stiffen the disk and to render it very dense or compact by closing up the pores and expelling the air therefrom. According to another method the sheet of metal of which the diaphragms are to be made may be treated in sheet form in the manner just described, and the disks then cut out to proper size and form. It is

expressly understood that by the action described the texture of the original metal is compacted or rendered more dense relatively to the original texture of the metal, whereby the disk is stiffened, strengthened and rendered more susceptible or sensitive to sound vibrations.

The diaphragm produced is provided with a central aperture B for attachment of the sound-receiving or transmitting device, as indicated in dotted lines in Fig. 1, in which the diaphragm is shown applied to the sound box of a graphophone. If a flat disk after being treated in the manner above described is still lacking in the desired stiffness or is bulged in the center to one side, a metal ring C is placed on the peripheral edge A' of the disk and subjected to a few blows or to pressure so as to uniformly act on the periphery of the disk in a manner to stiffen the latter or remove the bulge.

It is understood that the beating, pounding, pressing and hammering is done while the disk is held on a suitable anvil, and the indentations A' are also produced at the time the disk is resting on such anvil or similar foundation. The disk may be flat, as shown in Fig. 2; conical, as shown in Fig. 3; or spherical, as illustrated in Fig. 4, it being understood that for giving the desired form an anvil or form of corresponding shape is used, on which the disk is pounded, beaten, pressed or hammered to give the disk the desired shape in addition to rendering it exceedingly dense or compact.

In practice I have found that for a diaphragm one and three-quarter inches in diameter use is made of sheet metal of 28 or 29-gage, and a disk cut from this sheet metal, or the sheet before the disks are cut, is reduced by the pounding, beating, pressing, hammering or similar process to about 34 to 36-gage. For larger disks, say two and a quarter inches in diameter, the sheet metal selected is of 24 to 26-gage and the disk formed thereon is reduced by the process described to from 28 to 30-gage.

It is understood that the pounding of the disk spreads the same and thereby tensions the metal of the disk and after the pounding operation is completed the disk is cut down to the desired diameter.

A diaphragm constructed in the manner described and used in connection with any



sound-reproducing instrument or machine provides great volumes of sound or vibrations of tones and sounds.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The herein-described method of making diaphragms for sound reproducers, recorders, transmitters and receivers, which consists in cutting out a disk of sheet aluminum or similar metal and subjecting the disk to compression throughout to cause the metal to be compacted and flow from the center to the periphery whereby the disk is tensioned by the radial flow of the metal, and whereby the disk is of equal thickness throughout.

2. The herein-described method of mak-

ing diaphragms for sound reproducers, recorders, transmitters and receivers, which consist in cutting out a disk of sheet aluminum or similar metal, subjecting the disk to compression throughout whereby the disk is tensioned by the radial flow of the metal, and applying a peripheral pressure to produce an additional permanent compression, and thereby an additional permanent tension.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERIC W. THOMAS.

Witnesses:

THEO. G. HOSTER, Jr.,

PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

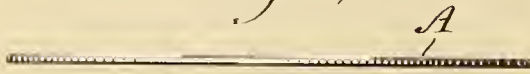


F. W. THOMAS.  
 DIAPHRAGM FOR SOUND REPRODUCERS.  
 APPLICATION FILED JULY 30, 1913.

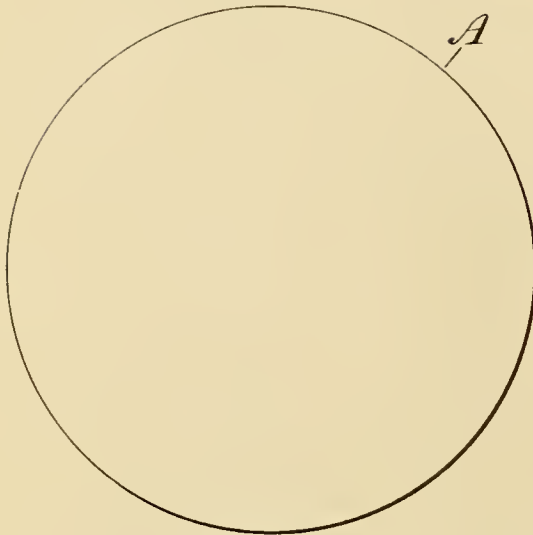
1,116,166.

Patented Nov. 3, 1914.

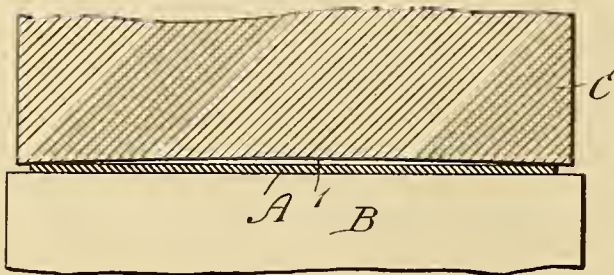
*Fig. 1,*



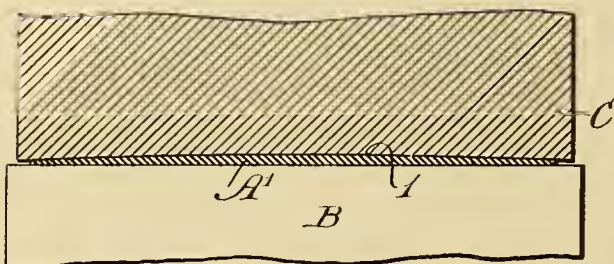
*Fig. 2,*



*Fig. 3,*



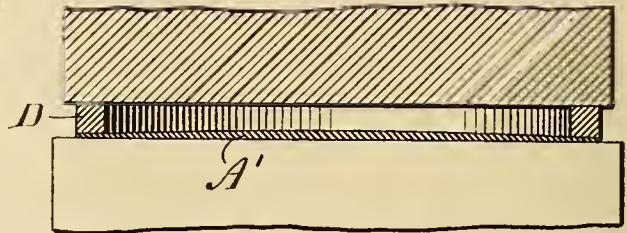
*Fig. 4,*



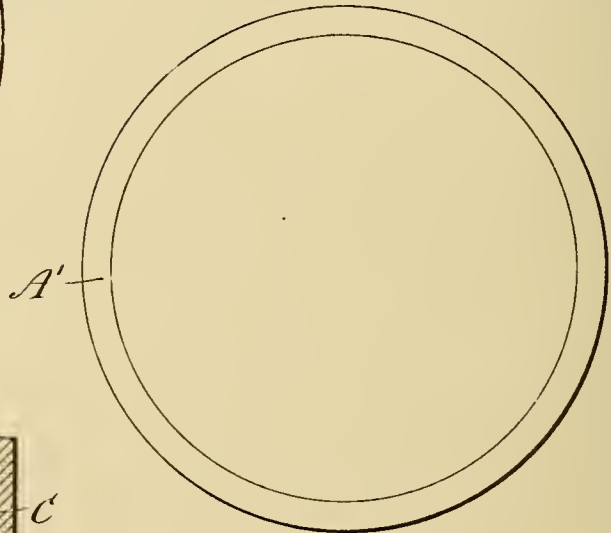
WITNESSES

*Edw. Thorpe*  
*C. Bradley.*

*Fig. 5,*



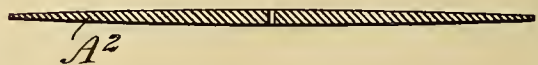
*Fig. 6,*



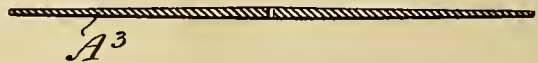
*Fig. 7,*



*Fig. 8,*



*Fig. 9.*



INVENTOR  
*Frederic W. Thomas*  
 BY *Munn & Co.*  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

FREDERIC W. THOMAS, OF NEW CITY, NEW YORK.

## DIAPHRAGM FOR SOUND-REPRODUCERS.

1,116,166.

Specification of Letters Patent.

Patented Nov. 3, 1914.

Application filed July 30, 1913: Serial No. 781,961.

*To all whom it may concern:*

Be it known that I, FREDERIC W. THOMAS, a citizen of the United States, and a resident of New City, in the county of Rockland and State of New York, have invented a new and Improved Diaphragm for Sound-Reproducers, of which the following is a full, clear, and exact description.

This invention relates to a diaphragm for sound recorders and reproducers and is especially adapted for use in phonographs, graphophones and the like.

At the present time mica diaphragms are in universal use for phonographic sound recorders and reproducers, although numerous other types of diaphragms have been proposed, and among these others are metallic diaphragms variously corrugated or indented for the purpose of obtaining a reproduction or recording of sounds equivalent to that obtainable with mica, the aim being to obtain a cheap substitute, as mica is expensive in the present condition of the market. Corrugated metallic diaphragms are unsatisfactory for various reasons but mainly on account of their weakness at the central part where buckling occurs, thus showing a lack of strength of material or required stiffness. According to another type of diaphragm, the diaphragm is flat throughout its area and the metal pounded to strengthen the diaphragm by compacting the material, and then the diaphragm is nickel-plated to prevent corrosion or affection by the elements. Such metal diaphragms being of the same thickness from center to edge are unsatisfactory because of the lack of stiffness at the center, and, furthermore, because of the coating of nickel-plate, which materially interferes with the tonal qualities.

It is the object of the present invention to overcome the objections above noted by producing a metallic diaphragm which in recording and reproducing qualities is superior to mica, far less expensive, smaller in size for the same capacity of sound reproducing and recording, and which is practically indestructible, whereas mica diaphragms are of very short life because of their laminated structure, which results in the separation of the laminae by the vibratory action.

In carrying out the invention any suitable metal may be employed that is practically unaffected by the weather and temperature changes, such metals being gold,

silver, platinum, antimony, tin, aluminum and the like, and alloys of such metals. Blanks cut from sheets of metal and preferably in the form of disks are subjected to a pounding, hammering or other compressing or compacting operation, whereby the metal is compacted and the air in the pores excluded. The pounding or hammering is so carried out that the resulting diaphragm will be of somewhat greater thickness at the middle than at the periphery, there being a gradual and uniform diminution of thickness from the center outwardly. During the shaping of the diaphragm the metal spreads radially, whereby the diaphragm acquires the required stiffness or rigidity and entirely overcomes any tendency to buckle. In other words, the diaphragm is of uniformly increasing strength from the supported periphery to the unsupported center.

When the diaphragms are made of certain kinds of metals it has been found beneficial to subject the diaphragm to a bath of cyanid of potassium, which tempers and strengthens the metal. It may also be necessary in some instances to increase the stiffness or rigidity of the diaphragm, after it has been acted on by the pounding or hammering dies which produce the uniform decrease in thickness from the center to the periphery, by stamping the entire peripheral portion of the diaphragm by means of an annular die which effects a radial expansion and hence radial stress because of the flow of metal outwardly in radial directions.

For a more detailed understanding of the invention reference is to be had to the accompanying drawings taken in connection with the following description and the claims appended hereto.

In the accompanying drawings, wherein similar reference characters designate corresponding parts throughout the several views, Figure 1 is a side view of a blank of metal from which a diaphragm is made; Fig. 2 is a plan view thereof; Fig. 3 is a view showing the blank in the initial stage being hammered; Fig. 4 is a similar view showing the final stage of pounding or hammering the diaphragm; Fig. 5 is a view showing the manner of compressing the peripheral portion of the hammered diaphragm; Fig. 6 is a plan view of the diaphragm resulting from the operation shown in Fig. 5; Fig. 7 is a sectional view of the finished diaphragm having one side flat and



the other side convex; Fig. 8 is a sectional view of a diaphragm convex on both sides; and Fig. 9 is a sectional view of a diaphragm which tapers from the center to the periphery on straight lines.

In carrying out the invention a circular metal blank A is cut out from a sheet of metal slightly smaller than the final diametrical size desired for the diaphragm, since in the pounding or hammering operation a blank expands in all directions from the center. This blank A, shown in Figs. 1 and 2, is placed on an anvil B, Fig. 3, and subjected to a pounding or hammering operation by means of a die C, the under surface of which is accurately shaped in such a manner as to give the desired final form or surface shape to the diaphragm. In the present instance the die in Fig. 3 is formed with a very shallow concavity, so that obviously in the beginning of the pounding operation the die will operate first on the entire periphery of the blank A. With the successive strokes the metal in the peripheral region of the diaphragm is compacted and expanded until finally the entire blank is operated on by the die, as shown in Fig. 4. This pounding of the metal greatly strengthens and stiffens the diaphragm so that buckling at the center is entirely overcome. This also is due to the fact that there is a greater stock of metal at the center than at the periphery. This shaping of the diaphragm may be effected by a continuously applied pressure of the die C, or by a single stroke instead of by a repetition of blows, as in hammering.

Should it be desired to impart greater stiffness or rigidity to the diaphragm than is performed by the die C, the entire peripheral portion of the diaphragm can be still further hammered to effect a uniform radial expansion from the center outwardly. To accomplish this an annular die D is applied to the periphery of the diaphragm A' after being finished by the die C, and a blow or pressure is applied to the annular die D, so as to compress the diaphragm A' to the same degree throughout the entire periphery, the annular die being of such size as to have an engaging surface of about three thirty-seconds of an inch in radial dimensions.

Instead of making the diaphragm flat on one side and convex on the other, as shown in Fig. 7, the diaphragm can, by suitably working the blank, be made convex on both sides, as shown by the diaphragm A<sup>2</sup>, as shown in Fig. 8, or as a further modification the diaphragm can be diminished in thickness from the center to the periphery along straight lines, as is shown by the diaphragm

A<sup>3</sup>, Fig. 9. From this it will be seen that the essential feature is that the diaphragm must be thickest at the center and decrease uniformly therefrom to the periphery, with its surfaces perfectly flat or uncorrugated or unindented. As a specific illustration of the variation in thickness between the center and periphery of the finished diaphragm it may be stated that a diaphragm one inch and three-quarters in diameter has a thickness at the central part which measures thirty-five, according to a micrometer gage, while the thickness at the periphery should measure about thirty-six and one-half or thirty-seven micrometer gage. Such a diaphragm is stiffened equally at corresponding points considered from the center to the periphery, and the center is as strong as at any other point, so that there is no tendency to buckle. A hammered or pounded diaphragm made as described is capable of reproducing sounds with the same effect as a mica diaphragm of larger size. For instance, a diaphragm of one and five-sixteenths inches under actual test is equivalent to a mica diaphragm of one and three-quarters inches in diameter, while a metal diaphragm of one and three-quarters inches in size is equivalent in reproducing quality to a mica diaphragm two and one-quarter inches in diameter.

With some kinds of metal it has been found beneficial to treat the diaphragm by giving it a bath in cyanid of potassium, the effect of which is to temper and strengthen the metal.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The herein-described method of making diaphragms for sound reproducers, recorders, transmitters and receivers, which consists in subjecting a disk of metal to a radially uniformly varying pressure whereby the diaphragm is tensioned by the radial flow of the metal.

2. The herein-described method of making diaphragms for sound reproducers, recorders, transmitters and receivers, which consists in placing a disk of metal with one face on a flat surface and subjecting the opposite face to a radially uniformly varying pressure whereby the diaphragm is tensioned by the radial flow of the metal.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERIC W. THOMAS.

Witnesses:

CHATTEN BRADWAY,  
PHILIP D. ROLLHAUS.

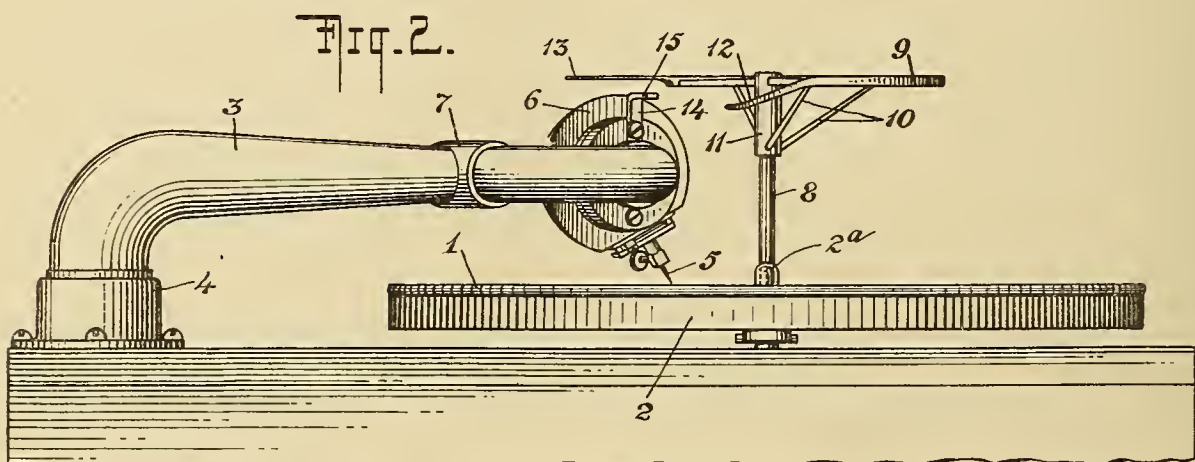
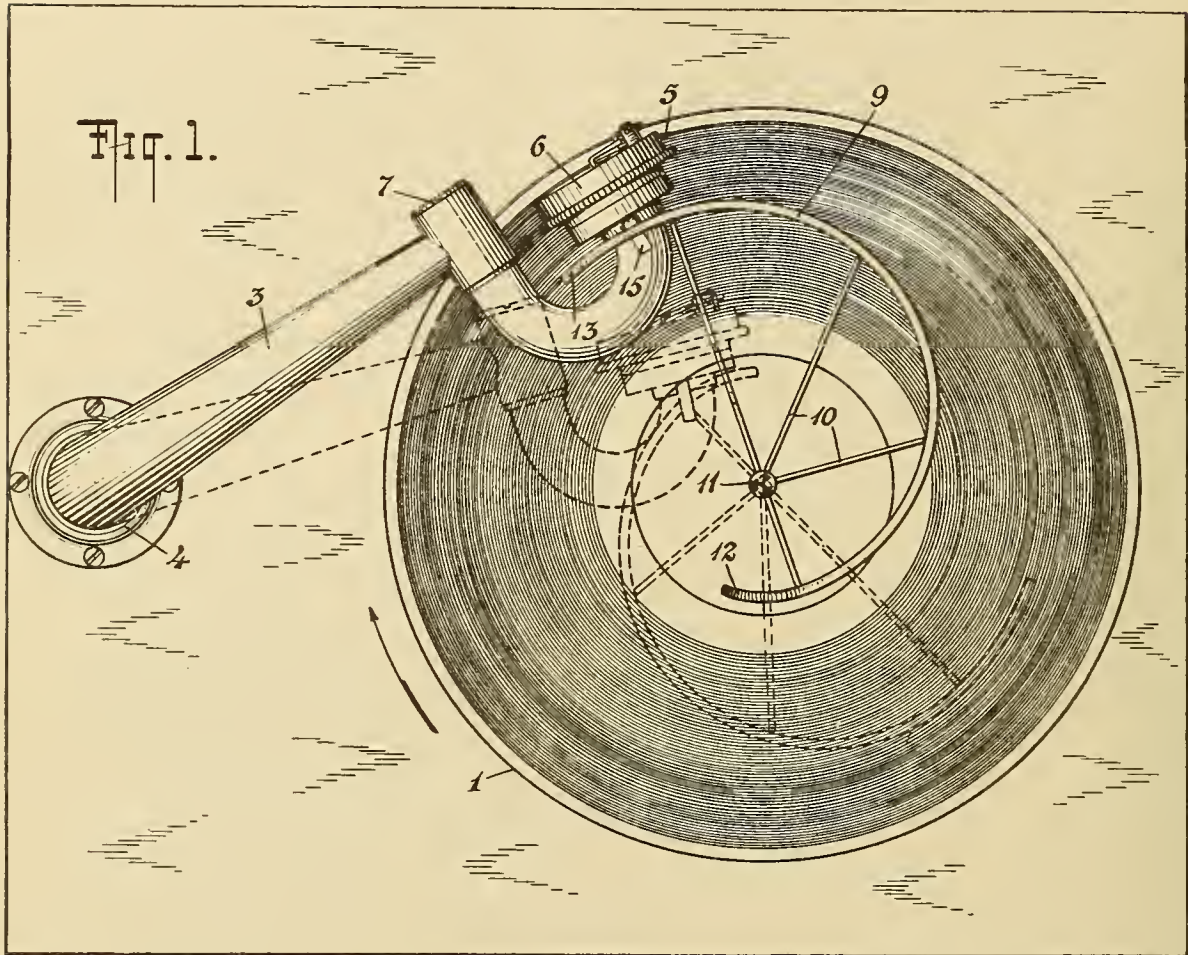




L. ABRAHAM.  
 REPEATING DEVICE FOR TALKING MACHINES.  
 APPLICATION FILED DEC. 4, 1913.

1,117,143.

Patented Nov. 10, 1914.



WITNESSES

*G. V. Rasmussen*  
*W. H. Lockwood*

INVENTOR

LAWRENCE ABRAHAM  
 BY  
*Brown & Knauth*  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

LAWRENCE ABRAHAM, OF NEW YORK, N. Y.

## REPEATING DEVICE FOR TALKING-MACHINES.

1,117,143.

Specification of Letters Patent.

Patented Nov. 10, 1914.

Application filed December 4, 1913. Serial No. 804,622.

*To all whom it may concern:*

Be it known that I, LAWRENCE ABRAHAM, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Repeating Devices for Talking-Machines, of which the following is a specification.

My invention relates more particularly to a device for use in connection with disk record machines although a device of similar nature can be arranged in connection with the records of various makes of machines.

My device is shown as applied to the well-known Victor talking machine and has for its object to adapt the machine to repeat the playing of the record by automatic means requiring no attention on the part of the operator other than keeping the motor going. My device when properly applied will also prevent the scraping of the needle after a record is played if the operator should neglect to lift the needle from the disk.

One form of my device as adapted to the Victor machine is illustrated in the accompanying drawings of which—

Figure 1 is a plan view and Fig. 2 a side view.

Referring to the drawings 1 represents a disk record supported upon and rotated by the usual motor driven table 2. The usual tone arm 3, which is pivoted at 4 and adapted for movement in a horizontal plane is provided with the usual needle 5 and sound box 6 which are adapted for movement in a vertical plane by the joint at 7. These parts and their operation are well known in the Victor talking machine and need no further description.

In applying my device the only change necessary is the formation of a socket in the table 2 at the portion 2<sup>a</sup> thereof. Preferably the socket is a square hole adapted to receive the lower, squared end of a rod or post 8 adapted to support a cam 9 in a plane parallel to the plane of the disk 1. The cam 9 primarily comprises a spiral track which begins near the axis of the disk and swings out in a gradual spiral to a point near the circumference thereof. The cam 9 may be constructed and attached to the post 8 in any preferred manner but preferably I construct the same of a rail or wire

bent in the required shape and supported by radial arms 10 secured in a bracket or hub 11 supported upon and secured to the top of the post 8. The inner end of the cam at 12 dips down below the plane of the cam 9 at an angle thereto for the purpose hereinafter described, and the outer end of the cam at 13 makes a similar inclined dip which should not normally stand below the plane of the cam but may be flexible.

It will be understood that in the normal operation of the Victor machine the needle 5 after being placed near the circumference of the disk 1 at the beginning of the record is gradually carried inward toward the axis where the record ends. When the end of the record is reached it is necessary for the operator to lift the needle and by swinging the tone arm carry it back to the starting point and set it on the disk if it is desired to repeat or play the record again. For the purpose of accomplishing this automatically the cam 9 is located in a plane parallel to the disk but at a sufficient height above it to clear the tone arm and diaphragm case. The case at 14 is preferably provided with an inverted L-shaped bracket the arm 15 of which lies below the plane of the cam 9 when the needle 5 is in playing contact with the disk 1, but when the needle has been carried inward toward the axis of the disk and the end of the record is reached the end 12 of the cam is adapted to strike under the arm 15 and, as the cam rotates with the arbor 2 of the record disk, the needle is lifted from the record. Further rotation of the disk and cam gradually transports the needle outward toward the circumference of the disk along the track of the cam until at the outer end of the cam 9 the arm 15 rides upon the dipping end 13 and the needle is again lowered into contact with the disk at the beginning of the record. This operation will continue as long as desired and the record will be repeatedly played. The dipping end 13 of the cam is preferably arranged to permit a free passage of the arm 15 thereunder in one direction so that when the needle is on the outer circumferential lines of the record the rotation of the disk will not be interfered with. For this purpose any suitable arrangement of the portion 13 may be employed such as mounting it as a spring or hinged pawl which will clear the arm 15 without interfering therewith. When it is desired to substitute



another record the cam 9 may be readily removed by lifting the post 8 out of the socket in the portion 2<sup>a</sup> of the table after which the disk may be lifted off and replaced by another record in the usual manner. If it is desired that the new record be played or repeated several times the cam 9 is replaced by inserting the end of the post 8 in the socket in the table and the record will be automatically repeated without any attention from the operator other than keeping the disk rotating.

I do not wish to be limited to the specific form here shown for it will be understood by those skilled in the art that various modifications and adaptations of my device may be made without departing from the spirit and scope of the claims.

I claim:

1. In a repeating mechanism for talking machines the combination of a rotatable record table, a reproducer needle, a cam rotatable with said table and adapted to lift said needle from an operative position at the end of a selection and move it in its inoperative position across the face of the table approximately to the starting point of said selection and means connected with said cam for permitting said needle to return to an operative position as said starting point is reached.

2. In a repeating mechanism for talking machines the combination of a rotatable record table, a reproducer needle, a cam rotatable with said table and adapted to lift said needle from an operative position at the end of a selection and move it in its inoperative position across the face of the table approximately to the starting point of said selection and a flexible member car-

ried by said cam for permitting said needle to yieldingly return to an operative position as said starting point is reached.

3. In a repeating mechanism for talking machines the combination of a rotatable record table, a reproducer needle, a projection connected with said needle, a spiral track extending about and connected with the axis of said table to rotate therewith, a downwardly inclined end portion forming part of said track and adapted to extend beneath said projection and guide the same to said track whereby the needle is lifted from an operative position at a predetermined point and moved back across the face of the table approximately to its starting point and a flexible opposite end member carried by said track for permitting said needle to yieldingly return to an operative position as said starting point is reached.

4. In a repeating mechanism for talking machines, the combination of a rotatable record table provided with a socket at its axis, a reproducer needle, a projection connected therewith, a rod adapted to removably fit said socket and rotate with said table, and a cam carried by said rod so as to extend over the face of said table and adapted to lift said needle from an operative position at a predetermined point and to permit said needle to descend to an operative position at another predetermined point.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

LAWRENCE ABRAHAM.

Witnesses:

ARTHUR G. JARVIS,  
JOSEPH P. SHEERAN.





H. W. HESS.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED AUG. 7, 1913.

1,118,345.

Patented Nov. 24, 1914.  
2 SHEETS—SHEET 1.

Fig. 1.

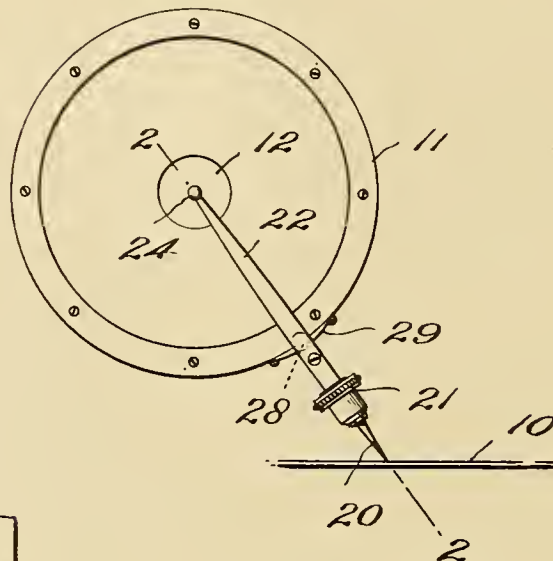


Fig. 2.

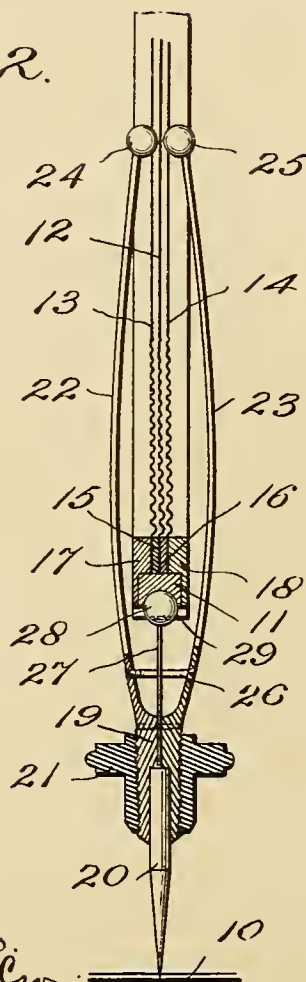
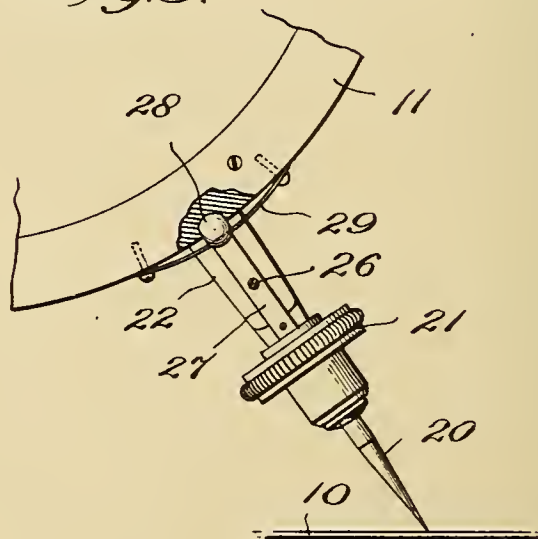


Fig. 3.



Witnesses.  
C. James Cronin  
Geo. H. Byrne.

Harry W. Hess  
Inventor

By his Attorney  
Wilkinson, Crista and MacKay



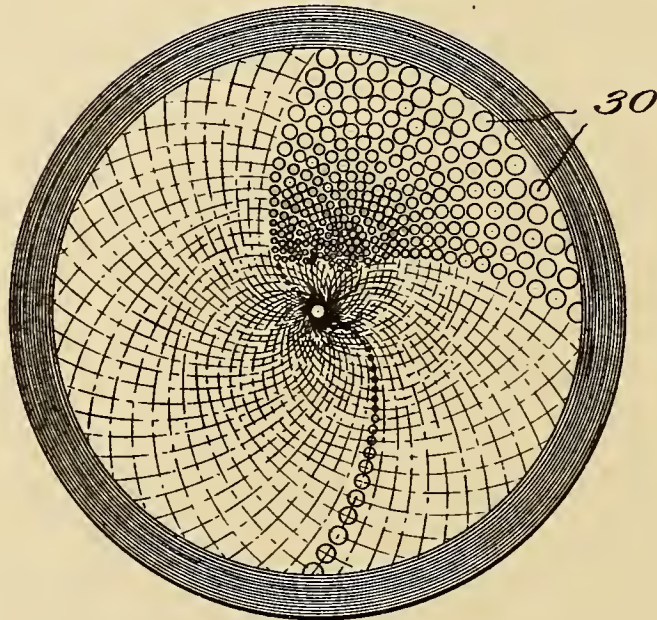


H. W. HESS.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED AUG. 7, 1913.

1,118,345.

Patented Nov. 24, 1914.  
2 SHEETS—SHEET 2.

*Fig. 4.*



*Fig. 5.*



Witnesses.  
C. James Cronin  
Geo. A. Byrne

Harry W. Hess  
Inventor  
By his Attorneys  
Wilkinson, Smith and Mackay

# UNITED STATES PATENT OFFICE.

HARRY W. HESS, OF NEW YORK, N. Y.

SOUND-BOX FOR TALKING-MACHINES.

1,118,345.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Application filed August 7, 1913. Serial No. 783,514.

*To all whom it may concern:*

Be it known that I, HARRY W. HESS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a form of reproducer for talking machines by the use of which the tone arm and horn hitherto used may be dispensed with, while at the same time greater accuracy of reproduction is attained.

One object of the invention is the provision of an improved diaphragm having a peculiar conformation permitting a single disk to accommodate itself to sounds of all qualities within any reasonable degree of pitch, without imposing upon the particular changing forms of vibration imparted to it any material coercion due to its own natural tone.

Another object of the invention is the provision of means whereby one or more thin layers of air are made active, each conforming as nearly as possible to the ideal form of the diaphragm.

The invention relates also to certain improvements in the mounting of the needle arm, and to other details hereinafter fully described.

I have illustrated the invention in a preferred embodiment thereof and by way of example, in the accompanying drawings, wherein—

Figure 1 is a front elevation of my combined apparatus as employed with a disk record seen in edge view, Fig. 2 is an enlarged sectional view of the same on the line 2—2 in Fig. 1, Fig. 3 is an enlarged sectional view of the mounting for the needle arm looking at right angles to Fig. 2, Fig. 4 is a face view of my preferred improved diaphragm, one quadrant only being shown completed, and Fig. 5 is a sectional view of a small portion of the diaphragm.

Some of the novel features of my mounting shown in Figs. 1 to 3 will be found useful with diaphragms of various forms, and I do not limit myself to the employment of such features with the peculiar improved diaphragm herein claimed.

The disk record is indicated in the drawings at 10, and I mount a supporting ring 11 in any suitable manner with relation to such disk. The particular mounting is not material to this invention and is not illustrated. Fitting within the ring 11 is the diaphragm 12, which I have shown indented, and on each side of the diaphragm is placed a parallel resonating tone plate 13, 14, separated from the main diaphragm by suitable gasket rings 15, 16. The collars 17 and 18 are fastened onto the ring 11, on the two sides to hold the group of vibrant disks together.

The tone plates are accurately matched to the formation of the main diaphragm, as shown, and there is thereby formed a thin layer of air on each side of the main diaphragm conforming to it in shape. It is to be understood that the gaskets 15 and 16 are made very thin, and the spacing of the various parts is exaggerated in the drawings for greater clearness.

The needle arm is composed of two branches meeting at 19, and slightly tapering to permit closing down of the same upon a removable needle 20, by means of a screw chuck 21. This simple construction permits of easy replacement of the needles, but, at the same time, when in place, these latter are so firmly united to the arm, as virtually to form one piece with it. By this means the minutest vibrations are transmitted without distortion.

The needle arm is made up of two similar separable branches of delicate spring structure, shown at 22 and 23, and each provided with a rounded enlargement 24, 25 bearing upon opposite faces of the main diaphragm at or very near its center. The arms 22, 23 pass through appropriate central apertures in the tone plates 13 and 14. The degree of pressure exerted by the spring arms 22, 23, is regulated by a set screw 26; and, of course, these pressures are equal, and therefore leave the main diaphragm quite free from any initial stress.

The arm and needle are supported upon the ring 11, by means of a leaf spring 27, gripped between the two parts of the needle arm, and is held by a fine set pin as shown in dotted lines, through which spring the shank of the screw 26 passes quite loosely. One end of this spring is thus fixed to the needle arm, while the other end terminates in a ball 28 fitting a socket in the ring 11,



as clearly shown in Figs. 2 and 3. The ball 28 is held up in place by a light strap or spring plate 29 fastened at its ends to the ring 11, and provided with an opening embracing the outward curve of the ball 28. In order to prevent useless movements and to confine the vibrations of the needle and arm to a plane substantially at right angles to the diaphragm, the ball is flattened on two sides as shown in Fig. 3. Other mountings permitting the vibratory movements described are within the scope of my broader claims.

In carrying out the construction so far described, I prefer to so proportion the parts that the center of gravity of the arm, chuck and needle lie as near as possible to the center of movement and in the plane of the diaphragm. It is also important for the best results that the arm be balanced with respect to a plane passing through the center of motion and at right angles to the plane of vibration. For this purpose the screw 26 is constructed, substantially as shown in the drawing.

The construction thus far described may be employed with various forms of diaphragm, but I prefer to use the diaphragm more completely illustrated in Figs. 4 and 5, which constitutes an important feature of the present invention.

In Fig. 4 a face view is afforded of a quadrant of my improved diaphragm, and it is to be understood that the remainder of the diaphragm is made like the quadrant fully illustrated. The dotted lines show the directions of successive rows of indentations. The gist of this feature of the invention lies in so forming the diaphragm that the active portions thereof, which are free to respond to the vibrations imparted, are restricted in accordance with certain principles of construction which I have found highly productive of sensitiveness to all kinds of waves. For this purpose the portions of the diaphragm which are not intended to be responsive are stiffened by means of indentations 30, producing concavities on one side and corresponding convexities on the other side. Broadly speaking this feature of my invention lies in applying to a diaphragm, rows of circular or polygonal indentations extending inward toward the center of the disk, these indentations increasing in size outward from the center as shown. Preferably this progressive increase in size is such as to cause the sum total of the diameters of the indentations in any circle drawn around the center to represent a substantially uniform percentage of the total periphery of each circle. The depths of successive indentations in the various rows decrease toward the center, preferably in the same proportion as the corresponding diameters of said indenta-

tions. Obviously, as the center is approached, observance of the above laws of construction will involve very delicate and accurate manipulation, and in practice there will be a certain area around the true center which will remain free of indentations. The smaller this area in proportion to the total area of the diaphragm, the more excellent will be the results obtained. In the drawing no attempt has been made to show the exact structure very near the center, but enough is shown to make clear the principles involved.

In the preferred embodiment of my invention, the rows of indentations follow a logarithmic spiral, which arrangement I have found to give the best results, and it will be observed that the indentations are so spaced that two sets of crossed spirals are produced, each affording reverse curves from one side of the diaphragm to the other. By this means the vibrations traveling outward from the center of impact are able to select natural outward and return paths of infinite varieties, according to their individual natures. Of course, the annular spaces covered by the clamping means are left flat.

It is obvious that the features which I have described and shown herein may be duplicated without departing from the invention, and indeed, many changes will occur to those skilled in the art which can be made within the scope of this invention, and I do not limit myself to the details herein shown and described.

What I claim is—

1. A diaphragm for acoustic purposes furnished with rows of indentations extending inward toward the center, the succeeding indentations decreasing gradually in depth toward the center, and said rows being separated by thin vibratory portions, substantially as described.

2. A diaphragm for acoustic purposes furnished with rows of indentations extending inward toward the center and decreasing inward both in depth and diameter.

3. A diaphragm for acoustic purposes furnished with rows of indentations extending inward toward the center and separated by corresponding vibratory plane surfaces, said indentations being so proportioned and located that each row of indentations and the plane strip next to it are slightly convergent, and each narrows gradually inward, substantially as described.

4. A diaphragm for acoustic purposes furnished with rows of indentations each conforming to a reversely curved line across the diaphragm.

5. A diaphragm for acoustic purposes furnished with rows of indentations each row conforming substantially to a reverse logarithmic spiral across the diaphragm.

6. A diaphragm for acoustic purposes fur-



nished with rows of indentations conforming substantially to a series of reverse spirals across the diaphragm and so spaced as to produce a second crossing series of reverse spirals of greater length than the first series.

7. A diaphragm for acoustic purposes furnished with rows of indentations, each row conforming to a reversely curved line across the diaphragm, said indentations decreasing in depth and diameter toward the center.

8. A diaphragm for acoustic purposes furnished with rows of indentations, each row conforming substantially to a reverse logarithmic spiral across the diaphragm, said indentations decreasing in depth and diameter toward the center.

9. In a talking machine reproducer, a diaphragm, a needle bar having two resilient arms adapted to straddle said diaphragm and impinge thereon and means for regulating at will the mutual pressure between said arms.

10. In a talking machine reproducer, a needle bar comprising two thin spring contact arms, means for clamping said arms upon a needle and means for adjusting the terminal pressures exerted by said arms toward each other.

11. In a talking machine reproducer, a

diaphragm, a support therefor having a socket, a needle bar adapted to impinge against said diaphragm, a truncated ball fitting said socket and connected with said bar and a strap fixed to said diaphragm-support having an opening embracing a portion of said truncated ball and adapted to hold said truncated ball in place.

12. In a talking machine reproducer, a diaphragm, a support therefor having a socket, a needle bar adapted to impinge against said diaphragm, a truncated ball fitting said socket, means for holding said truncated ball in said socket and a flat spring connecting said needle bar and truncated ball.

13. A resonating group for acoustic purposes, comprising in combination a diaphragm furnished with rows of indentations conforming to reversely curved lines across the diaphragm, and a resonating tone plate of identical conformation mounted parallel to said diaphragm and close to it.

In testimony whereof I affix my signature, in presence of two witnesses.

HARRY W. HESS.

Witnesses:

GEO. A. BYRNE,  
C. JAMES CRONIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1. The first thing I noticed when I stepped out of the train was the cold. It was a sharp contrast to the warm, humid air of the South. I pulled my coat tighter around me and looked up at the sky. The stars were out, and the moon was a pale, silvery disk in the dark. I felt a sense of peace and solitude that I had never experienced before. The city lights were visible in the distance, but they did not disturb the quiet of the night. I took a deep breath and felt the cool air fill my lungs. It was a moment of clarity, a moment where I knew exactly who I was and where I was going. I walked slowly, savoring the silence and the beauty of the night. The cold was not a burden; it was a gift. It reminded me of the quiet strength I had within me, the resilience that had carried me through so many challenges. I was home, and I was exactly where I needed to be.

2. The second thing I noticed was the smell. It was a mix of old wood, fresh bread, and the salty sea air. I had heard that the town was famous for its bread, and now I could see why. The bakeries were everywhere, and the scent of yeast and flour was in the air. I walked down the main street, and the people looked at me with curiosity. I was a stranger in a strange land, but I felt a sense of familiarity. The architecture was different, but the spirit of the place was the same. I saw the same warmth and hospitality that I had found in the South. The people here were friendly and welcoming, and they made me feel like I had found a new home. I stopped at a small cafe and sat at a table. The owner, an old man with a white beard, smiled at me and brought me a cup of coffee. It was the best I had ever tasted. I looked up at him and saw the same kindness and wisdom that I had seen in the people of the South. I felt a sense of connection, a sense of belonging. I was no longer a stranger. I was part of this community, and I was proud to be here.

3. The third thing I noticed was the sound. It was the sound of the sea, the sound of the wind, and the sound of the people. I had heard that the town was built on a cliff overlooking the ocean, and now I could see why. The sea was a deep, dark blue, and the waves were crashing against the rocks. The wind was a soft, steady breeze that carried the scent of the sea. The people were talking, laughing, and singing. It was a sound of life, a sound of joy. I walked down to the beach and sat on the sand. The sun was setting, and the sky was a mix of orange, red, and purple. I looked out at the sea and felt a sense of awe. The ocean was so vast and so powerful, and it reminded me of the challenges I had faced. But I was stronger now, and I was ready to face whatever came my way. I stood up and walked back to the town. The people were still out there, and I knew I would find them. I was home, and I was exactly where I needed to be.





E. R. JOHNSON.  
SOUND BOX.  
APPLICATION FILED MAR. 14, 1903.

1,118,348.

Patented Nov. 24, 1914.

Fig. 1.

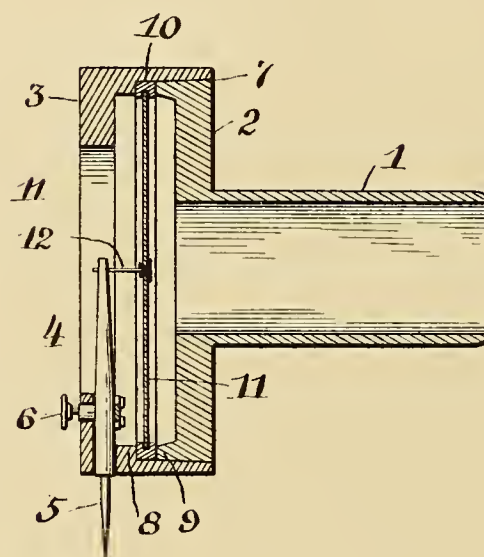


Fig. 2.

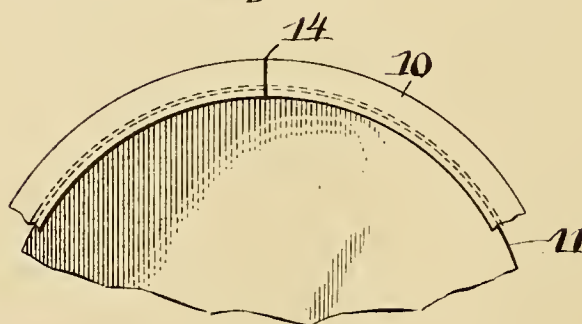


Fig. 3.

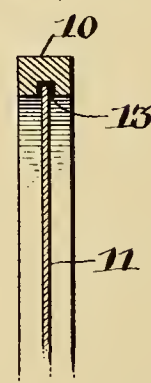
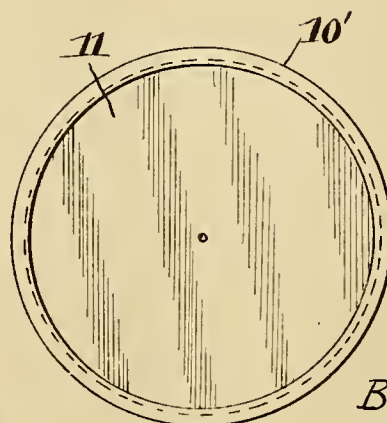


Fig. 4.



WITNESSES:

*Jno. T. Gross*  
*Edw. W. Vaill Jr.*

INVENTOR:

*Eldridge R. Johnson,*  
By *Home Potts,*  
ATTORNEY:

# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-BOX.

1,118,348.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Application filed March 14, 1903. Serial No. 147,733.

*To all whom it may concern:*

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming a part of this specification.

The main objects of this invention are to provide in a sound box an improved casing; an improved mounting for a diaphragm; and other improvements as will appear hereinafter.

In the accompanying drawings Figure 1 is a longitudinal central section of a sound box constructed in accordance with this invention; Fig. 2 an enlarged fragmentary front elevation of the diaphragm and its mounting; Fig. 3 a transverse section on a radial line of Fig. 2 and Fig. 4 a front elevation of a diaphragm mounted in a continuous ring.

Referring to the drawings, the improved sound box comprises a casing having the usual tubular portion 1, projecting rearwardly from the box, communicating with the interior of the box, and whereby the box may be attached to the usual tubular support. Integral and concentric with this tubular portion 1, is an annular plate 2 forming the back of the casing and having a forwardly, tapering conical peripheral surface 7, concentric with and approximately parallel to the longitudinal axis of the box, which fits tightly into a corresponding tapering socket in the rear side of the front portion 3 of the casing, forming a tapering joint, the two portions being driven or forced together by suitable pressure.

Mounted upon the inside of the front portion of the casing, and projecting through an aperture in the side thereof, is a stylus bar 4, carrying the usual stylus 5, held in place by a set screw 6, which projects forwardly through the front of the casing.

The interior portions of the front and back of the sound box casing are recessed to form a diaphragm chamber, providing oppositely arranged internal circular flanges 8 and 9, adapted to cooperate to hold in po-

sition the ring or support 10, which carries the diaphragm 11, the ring being clamped between the two flanges 8 and 9. The diaphragm is connected to the stylus bar by a small rod 12, or other well-known means.

The ring 10 for supporting the diaphragm is provided with an internal groove 13, substantially rectangular in cross section, and centrally within this groove is secured the peripheral edge of the diaphragm, by means of a suitable elastic cement. This groove is preferably made about .01 of an inch in depth and about .005 of an inch wider than the thickness of the diaphragm, which is usually about .005 of an inch; thus leaving a space in the groove about .0025 of an inch wide on each side of the diaphragm, and the diameter of the diaphragm is such as to leave about the same width of space between its peripheral wall and the bottom of the groove. This space in the groove between the diaphragm and the ring is filled with an elastic cement which is preferably inserted after the diaphragm is in position, by means of a small syringe or similar tool, the cement being brought into contact with the peripheral wall of the diaphragm and with a narrow annular marginal area of each side of the diaphragm.

As the diameter of the diaphragm is larger than the internal diameter of the ring in which it is mounted, the ring is preferably constructed in split form, being divided transversely, as at 14, to permit the ring to be sprung open to receive the diaphragm. After the diaphragm is in place in the ring, the ends of the ring may be joined by soldering, or brazing, or otherwise, and the cement is then inserted as above described.

Instead of a split ring a continuous ring may be made of malleable metal, such as tin, and of internal diameter sufficient to admit the diaphragm 11 without the expansion of the ring, the ring being provided with an internal circumferential groove as heretofore described. When such a ring is used, the diaphragm is placed within the ring opposite the groove therein and the ring is then compressed radially in a suitable machine, reducing the diameter of the ring until its internal diameter is less than the diameter of the diaphragm. The dia-



phragm is then held centrally in position in the groove, and the space between the diaphragm and the walls of the groove is then filled with elastic cement, as heretofore described.

When the diaphragm has been mounted in the ring 10 by either of the methods above described, the ring is then placed in the tapered recess in the front portion 3 of the box, with its periphery engaging the tapered surface 7, near its outer edge, and is forced into its ultimate position, as shown in Fig. 1, by the back portion 2, whose flange 9 is co-operative with the flange 8 of the portion 3, to form a groove in which said ring 10 is rigidly retained.

The sound box constructed in accordance with this invention is simple in design, easy to manufacture and may be quickly and easily assembled or taken apart, and the diaphragm is protected from injury and is free to vibrate without being influenced by any degree of pressure that may be brought to bear between the portions of the casing that hold the diaphragm mounting in place.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States is:—

1. A diaphragm supporting ring having a diaphragm receiving groove in its inner surface, said ring having a greater internal diameter than the diameter of the diaphragm, and being adapted to be contracted about the diaphragm to a smaller internal diame-

ter than the diameter of the diaphragm to retain the diaphragm in the groove.

2. A diaphragm supporting metal ring having a diaphragm receiving groove in its inner surface, said ring having a greater internal diameter than the diameter of the diaphragm, and being adapted to be contracted about the diaphragm to a smaller internal diameter than the diameter of the diaphragm to retain the diaphragm in the groove.

3. A diaphragm mounting ring having a longitudinal groove in its inner surface, said ring being split transversely with its ends spaced apart and being of a size to pass freely over a diaphragm, the distance between said ends being sufficient to permit the ring to be contracted to receive the diaphragm in said groove.

4. A diaphragm supporting ring having a diaphragm receiving groove in its inner surface, said ring being split transversely and having when its ends are spaced apart, a greater internal diameter than the diameter of the diaphragm, and having when its ends are brought together a smaller internal diameter than the diameter of the diaphragm.

In witness whereof I have hereunto set my hand this second day of March, A. D., 1903.

ELDRIDGE R. JOHNSON.

Witnesses:

J. H. WOODWORTH,

W. S. WOODWORTH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

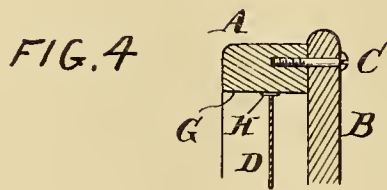
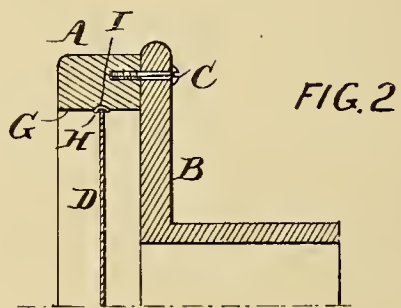
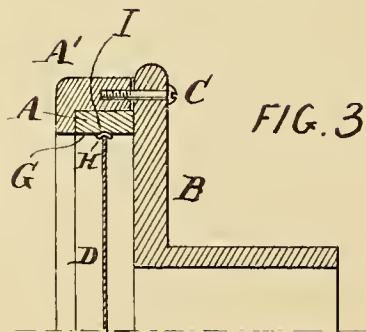
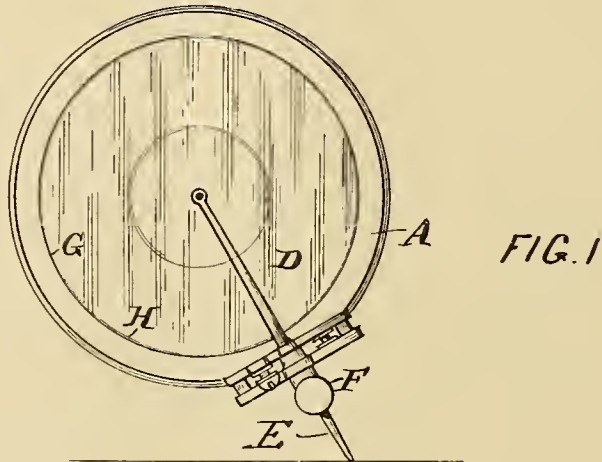




R. L. GIBSON.  
SOUND BOX FOR REPRODUCING AND RECORDING SOUND WAVES.  
APPLICATION FILED JULY 31, 1907.

1,118,647.

Patented Nov. 24, 1914.



Witnesses  
A. M. Kelly  
a. Rettig

Inventor  
Robert L. Gibson  
By   
Attorney

# UNITED STATES PATENT OFFICE.

ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-BOX FOR REPRODUCING AND RECORDING SOUND-WAVES.

1,118,647.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Original application filed May 7, 1907, Serial No. 372,432. Divided and this application filed July 31, 1907. Serial No. 386,420.

*To all whom it may concern:*

Be it known that I, ROBERT L. GIBSON, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Sound-Boxes for Reproducing and Recording Sound-Waves, of which the following is a specification.

My invention has reference to sound boxes for reproducing and recording sound waves, and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

This application is a division of my application Ser. No. 372,432, filed May 7, 1907.

The object of my invention is to provide a suitable manner of supporting the vibrating diaphragm with which the stylus bar connects, whereby the extreme perimeter or circumferential edge of the diaphragm will alone be held in engagement with the ring or casing of the sound box, and by reason of which the vibrations of the diaphragm will be independent of the elasticity of any intermediate supporting means in the plane of the vibrations such as have been heretofore employed and which cover a material portion of the face of the diaphragm.

My invention consists in providing a metallic ring portion which may be secured to or form a part of the case of the sound box in which the interior diameter is accurately formed, so as to cooperate with the extreme outer edge or perimeter of the diaphragm so as to hold the same definitely in position by a slight clamping action upon substantially the entire perimeter of the diaphragm, whereby the entire diaphragm is free to vibrate, while at the same time the perimeter is practically held against movement.

More specifically, my invention consists in providing the interior surface of the ring of such a construction that different portions thereof have different diameters, and by means of which the diaphragm may be crowded into position so as to be held at its extreme perimeter at one definite place within the ring, and in interposing between the perimeter of the diaphragm and that por-

tion of the ring which it is to engage, an exceedingly thin layer of yielding material, whether of textile or other material, which while not having any material elasticity will form a better binding union between the extreme outer circumference of the diaphragm and the metal ring which supports it.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:

Figure 1 is a front elevation of a sound box, embodying my improvements; and Figs. 2, 3 and 4 are enlarged cross sections showing definite manners of uniting the ring and diaphragm, embodying my invention.

A is the metallic ring in which the diaphragm D is secured.

B is the back which is attached to the ring through the medium of screws C. This back is of the usual construction and connects with the flexible tubular arm for leading the sound waves to the horn.

D is the diaphragm and is connected with the metallic ring A wholly by pressure exerted upon its extreme circumference or periphery.

E is the stylus bar which is connected at one end with the center of the diaphragm D and is pivoted at F to the ring or main frame of the case of the sound box.

I have shown my invention in connection with the form of the sound box commonly sold on the market under the name of the "Exhibition" box, but it is to be understood that my invention is equally applicable for use in connection with all sound boxes to which it may be adapted.

The form of the interior of the ring A is preferably such that while of the same cross section transversely to the plane of the diaphragm it has its interior surface formed of different diameters in different parallel planes. This is shown in Figs. 2 and 3 by the groove I and in Fig. 4 by the tapered shape of the interior. When the groove is used it is made very small and in such case the diaphragm with its interposed layer II



of textile or yielding material is crowded into the groove as shown in Figs. 2 and 3, and said diaphragm will retain its position when relieved of the inserting pressure. By use of the groove, however slight, the diaphragm will not be displaced by rough handling during transportation or by jarring should the sound box be dropped.

Referring to Fig. 3, we have the same construction as shown in Fig. 2, but in this case the part of the case in front of the back is formed of two annular parts, namely, the ring proper A and the outer ring A', which latter is secured to the back by screws C and clamps the inner ring A between the parts A' and back B. By this construction, new diaphragms with the rings attached may be substituted in the general framing of the sound box without having to insure the screw holes coming into proper position.

In Fig. 4 I have shown the interior surface G of the ring made slightly tapering so as to permit the free entering of the diaphragm D and interposed layer H and form a strong frictional contact when the parts are adjusted to the proper relative position as shown.

While it is common to employ mica as the material of which the diaphragm is made and while my invention is especially useful with such material, I do not restrict myself to any particular material for the diaphragm as it may be of mineral, vegetable or metal substances as found most desirable.

While I have shown the construction I deem most preferable in practice in the embodiment of my invention for commercial use, I do not restrict myself to the minor details thereof, as they may be modified without departing from the spirit of the invention.

Any matters herein shown and not claimed either specifically or generically form subject matter of my application aforesaid of which this is a division.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a sound box for reproducing and recording sound waves, the combination of a metallic ring structure having its interior surface formed with a continuous or annular groove, a textile material having yielding properties arranged in the ring adjacent to the grooved portion thereof, and a diaphragm having its perimeter locked in the groove by being forced therein upon the textile material and having its faces free and unobstructed.

2. In a sound box for reproducing and recording sound waves, the combination of a metallic ring structure having its interior surface formed with an annular groove of small cross section, with a thin layer of

yielding material over the groove, a diaphragm having its extreme perimeter forced into retaining engagement with the ring through the yielding material in the plane of the groove, a back plate having a tubular aperture for connection with a horn, an inwardly flanged clamping case ring for clamping the ring holding the diaphragm and centering it, and screws for drawing the case ring to the back extending at right angles to the plane of the diaphragm and arranged outside of the ring holding the diaphragm.

3. In a sound box, the combination with a diaphragm, of a mounting therefor, a fabric between said mounting and said diaphragm, and frictionally retained in said mounting to hold said diaphragm in place.

4. In a sound box, the combination with a diaphragm, of a mounting therefor and a strip of fabric between the edge of said diaphragm and the surface of said mounting, said strip being of normally uniform thickness and being frictionally retained by said mounting to hold said diaphragm in place.

5. In a sound box for reproducing and recording sound waves, the combination of a metallic ring structure having its interior surface uniform throughout, with a circular diaphragm having its extreme perimeter alone held by frictional engagement adjacent to the interior surface of the ring and under tension, and a compressed layer of textile material between the ring and perimeter of the diaphragm and of a width only slightly greater than the thickness of the diaphragm and greatly less than the width of the ring.

6. In a sound box for reproducing and recording sound waves, the combination of a metallic ring structure, with a circular diaphragm having its extreme perimeter held by frictional engagement adjacent to the interior surface of the ring and under tension, and a thin textile layer of greatly less width than the ring interposed between the perimeter of the diaphragm and the ring and under compression so as to extend very slightly to opposite sides of the diaphragm whereby the diaphragm is held only at its perimeter and under tension and its entire faces are free and unobstructed.

7. In a sound box for reproducing and recording sound waves, a diaphragm formed of a flat circular sheet bounded on its periphery by a textile band of a width only slightly greater than the thickness of the diaphragm and secured in position by frictional contact of its textile band with the inner face of the sound box.

8. In a sound box, the combination with a diaphragm of a metallic ring and a thin layer of yielding material interposed between the perimeter of the diaphragm and

the inner wall of the ring and held by frictional contact in the ring and holding the diaphragm by frictional contact with its perimeter.

5 9. In a sound box, the combination with a diaphragm of a mounting therefor and a thin layer of yielding material between said mounting and said diaphragm and friction-

ally retained in said mounting to hold said diaphragm in place.

In testimony of which invention, I have hereunto set my hand.

ROBERT L. GIBSON.

Witnesses:

R. M. HUNTER,

R. M. KELLY.

10

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



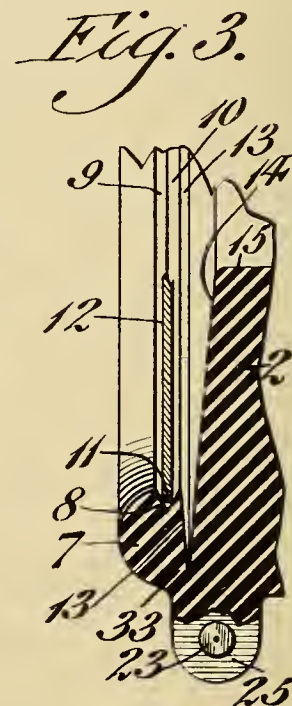
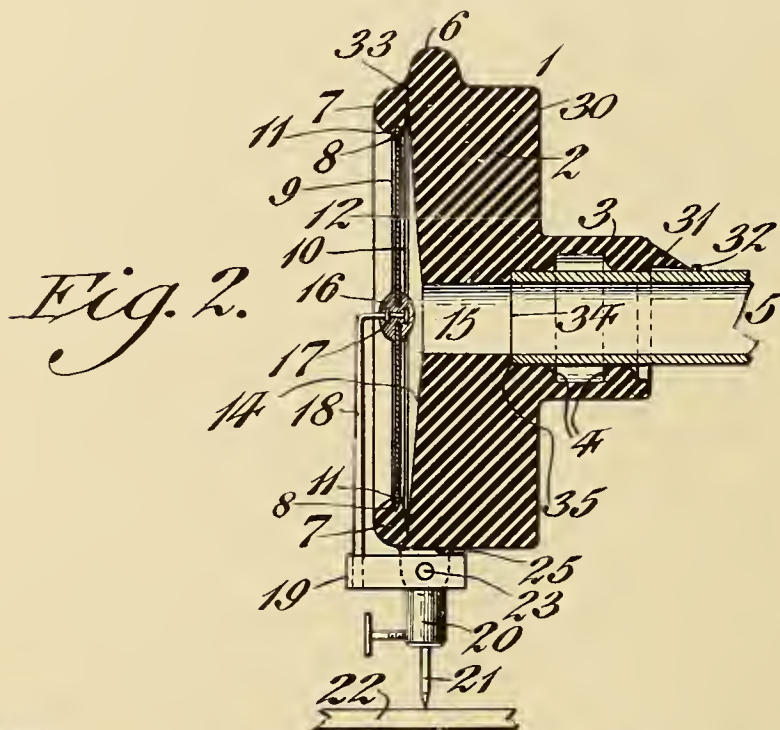
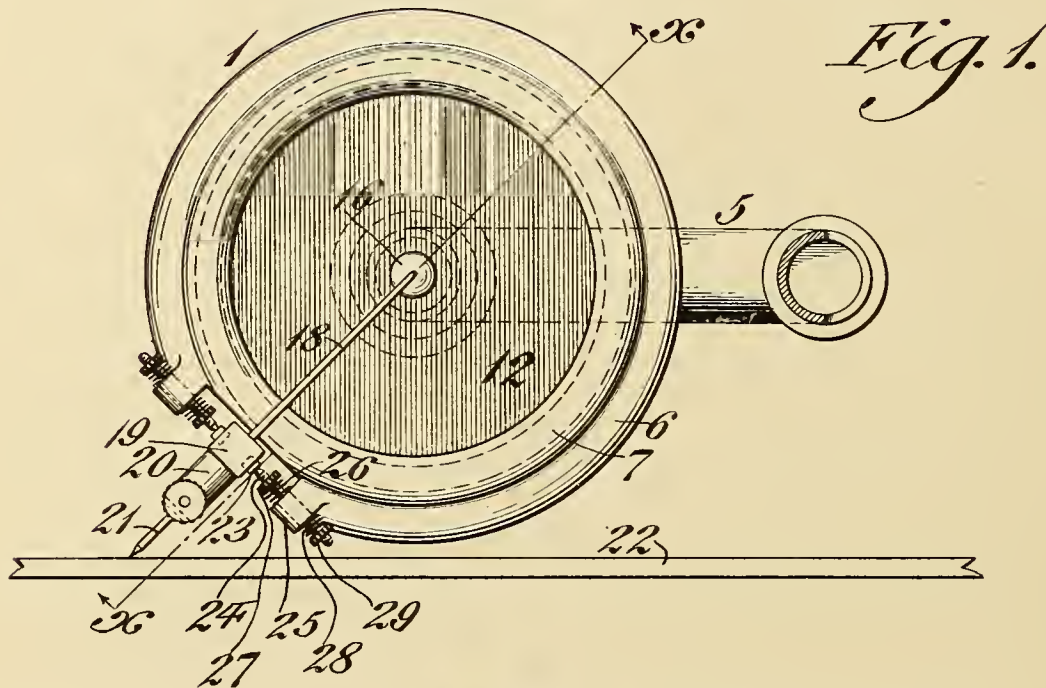




A. D. JONES.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED MAR. 26, 1914.

1,118,653.

Patented Nov. 24, 1914.



WITNESSES

*L. Douville,*  
*P. F. Nagle.*

INVENTOR

*Alva D. Jones.*  
BY *Niedersheim & Gumbauers.*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

## SOUND-BOX FOR TALKING-MACHINES.

1,118,653.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Application filed March 26, 1914. Serial No. 827,353.

*To all whom it may concern:*

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Talking-Machines, of which the following is a specification.

In sound boxes for talking machines, as generally constructed, the sound reproducing diaphragm is detachably held in position by one or more detachable annuli of rubber or similar material and the sound box is composed of a plurality of metallic and rubber parts united together by screws, the various parts having rubber insulation between them, whereby the cost of production is greatly increased.

It is further well-known that most sound boxes in use frequently emit a metallic or scratchy sound accompanying the reproduction of sound from the sound reproducing tablet. By my present invention, I construct the entire sound box body of a single body of rubber or similar suitable material, the main body portion of the box having attached thereto by an annular, resilient, integral hinge, a front annular bead, having a diaphragm seat therein, said bead being softer or semi-cured with respect to the sound box body, which latter is harder or cured to a harder degree than said front annular bead containing the diaphragm seat.

I have discovered as the result of an extensive series of experiments, that rubber when properly cured to the requisite degree, possesses many characteristics of the human throat when employed for a sound reproducing agent, and by constructing the entire sound box body of rubber and mounting the diaphragm in a seat within the front annular bead, which is softer than the sound box body, I have produced a device whereby the sound delivered from the diaphragm is greatly mellowed and improved, and a clear and distinct articulation obtained, provision thus being made for the diaphragm to be yieldingly supported so that it has capacity for vibration adjacent to its perimeter as well as its center, my novel sound box and its adjuncts being inexpensive to construct, sensitive in action, easily and quickly repaired and readily accessible for the purpose of inspection or replacement of parts, means being thus provided for a general improvement of the tones, amelioration of the

scratchy, metallic or grinding sounds common in instruments of this class, and provision being thus made for a faithful development and reproduction of the delicate sounds ordinarily difficult to reproduce, which are reproduced by my device with a maximum degree of fidelity and faithfulness to the original.

To the above ends, my invention consists of a novel construction of a one-piece sound box composed of rubber or similar material, wherein the body portion is thickened and cured to the requisite degree of hardness, said body portion having integral with or secured to the front portion thereof, an annular bead encircling and containing the diaphragm, the material of which said bead is composed being softer than the body of the sound box, whereby the requisite capacity for the vibration of the diaphragm at its outer and intermediate portions is provided.

It further consists of a novel construction of a sound box having a one-piece body of rubber or similar material of varying degrees of hardness, within the softer portion of which the mica or other diaphragm is cast or molded, without necessitating the employment of extraneous fastening devices.

It further consists of a novel method of molding or casting my novel sound box body.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same will be found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a side elevation of a sound box for talking machines, gramophones, graphophones and the like, embodying my invention. Fig. 2 represents a section on line  $x-x$  Fig. 1. Fig. 3 represents a view similar to a portion of Fig. 2, showing the sound box on an enlarged scale.

Similar numerals of reference indicate corresponding parts in the figures.



Referring to the drawings:—1 designates my novel construction of sound box having the rear wall 2 of considerable thickness, and provided with the rearward extension 3, having the internal, annular rib or ribs 4, which are adapted to frictionally engage the tube 5 of the reproducer or horn element, (not shown). The outer forward portion of the sound box body is provided, in the present instance, with a peripheral bead 6, which may be omitted, but which in the present instance terminates in the front annular bead 7, which has a preferably V-shaped annular seat 8 formed by the walls 9 and 10, said seat being adapted to receive the peripheral outer edge 11 of the diaphragm 12, which edge is preferably square, as will be understood from Fig. 3. The inner wall 10 (see Fig. 3) of the seat 8 has projecting outwardly therefrom the inclined wall 13, which meets the inclined front wall 14 of the sound box body, which terminates in the opening 15, whereby the reproduced tone waves are conveyed to the sound conveying member 5. The diaphragm 12 has an opening therein at about its center, wherein is located a mass of suitable cementing material 16, such as rubber or the like, in which is embedded the end 17 of the stylus arm 18, at the lower portion of which is the bar 19, which carries the chuck 20 for the stylus 21, which engages the rotary tablet 22 of the usual construction. A pivot-block or bearing 23, of hard material, such as a jewel or semiprecious stone, is secured in each side of the bar 19 of the stylus-support, and the pointed inner ends of two pins, 24, engage such pivot-blocks and are freely adjustable in transverse bores in ears or lugs, 25, preferably formed integral with the sound box body and upon the periphery of the same. Nuts, 27 and 29, fit upon each of said pins at the inner and outer sides, respectively, of the ears, and tension devices or springs, 26 and 28, are coiled around the pins and held between the nuts and the ears, so that the pins form yielding pivot-supports for the stylus-support 19.

It will be understood that the above described construction of floating bearings is substantially identical with the construction described in my prior application, Serial #820,643, filed February 24th, 1914, the stylus holder being permitted to freely vibrate to a limited extent between the lugs 25, as is evident.

It will thus be seen that by my novel construction, I have provided a novel bearing on each side of the stylus holding device, which will be extremely durable, and whereby an exceedingly faithful reproduction of the desired sounds will be had.

In the construction or manufacture of my novel sound box, I preferably employ

rubber or similar material, and produce the same by the operation of molding or casting, particular attention being directed to the fact that the front wall 14 of the box and the body or mass of material contiguous thereto, is of about the same degree of hardness as the rear wall 30 and the mass of material contiguous thereto, which can be readily effected by those skilled in the art during the operation of casting or molding the rubber of which the box is composed. Especial attention is also directed to the fact that the front bead 7, containing the diaphragm seat 8, together with its rear wall 13, is made of softer or semi-cured rubber, which is secured to the harder body portion by an annular, integral, resilient hinge 33, the front bead 7 containing the diaphragm seat 8 being semi-cured or softer than the portions 14 and 30 of the sound box body. By this construction, all scratchy, harsh or metallic sounds are absorbed in the body portion 2, which I preferably make of considerable thickness, and by locating the annular diaphragm seat 8 in the softer front bead 7, I attain the requisite resiliency for the vibratory member 7, whereby the diaphragm is permitted to vibrate near its periphery, as well as at its center, to the requisite extent.

By casting the lugs 25 of the same material as the sound box body, it will be seen that all undue chatter or vibration of the stylus holder and its adjuncts will be absorbed, since in no instance in my novel construction does metal come in contact with metal. I desire to also call especial attention to my manner of securing the terminal 17 of the stylus arm to the diaphragm, since by the employment of the mass of cementing material or rubber 16, the metal of said stylus arm is prevented from contacting with said diaphragm so that there is no possibility in any portion of my device for any chattering or improper vibration or rattling to take place, (which will impair a faithful reproduction,) which will not be absorbed in a proper manner.

I desire to also call attention to the fact that I dispense with the bayonet joint commonly employed to effect the interlocking of the rearward extension 3 with the tube 5, since in the present instance, I provide a pointer 31 thereon adapted to aline with a pin or mark 32 on the tube 5, whereby upon said pointer and pin being properly alined, the stylus 21 will contact with the disk or tablet 22 at the proper angle. By casting or molding the entire sound box in one piece of rubber or similar material, having the proper portions thereof semi-cured or softer than other portions as described, I am enabled to greatly reduce the cost of production and to dispense with the plurality of rubber and metallic parts, such as



screws, nuts, knife edges and the like, heretofore employed, at the same time producing a device of superior excellence.

It will be apparent from Fig. 3, that by reason of the diaphragm seat 8 being composed of the inclined walls 9 and 10, the square, peripheral edge of the diaphragm 12, which is assembled simultaneously with the molding of the semi-cured, annular bead, 7, will at all times properly contact or engage with said walls 9 and 10, and by reason of the annular, resilient, integral hinge at about the point 33, which forms the point of junction between the annular, semi-cured bead 7 and the fully cured sound box body 2, sufficient play or vibration will be imparted to said bead 7 containing the diaphragm seat 8, so that the outer peripheral portions of the diaphragm will be permitted to have the requisite extent of vibration, as will the central and intermediate portions of said diaphragm.

In practice, the body portion 2, which comprises substantially the mass of material between the walls 14 and 30 in my method of molding or casting my novel sound box, may be at first semi-cured and then the annular bead or ring 7 which may be first shaped independent of the sound box body 2 with the diaphragm therein, can be integrally united with the outer portion of the wall 14 at the point 33, after which the curing of the mass of rubber is completed, the body portion 2 of the box being then completely cured, and the front, annular, peripheral bead 7 being semi-cured, so that the desired degree of comparative softness and hardness as regards the front bead 7 and the sound box body 2 can be readily attained by those skilled in the art.

It will be apparent that the molding or casting of the sound box body in its entirety, as the same appears in Fig. 2 with the diaphragm 12 assembled within the encircling front bead 7 of softer material, may be effected in various other ways than that described, but inasmuch as I believe myself to be the first in the art to produce a sound box body of the character described, having a diaphragm retaining portion of soft material and an integral thickened body portion of harder material for the purpose stated, I reserve the right to make all such changes as will come within the spirit of my invention or the scope of the appended claims.

It will be seen that by the employment of the rubber or other cementing material 16, whereby I effect the assembling of the terminal 17 with the diaphragm 12, as will be understood from Fig. 2, said terminal being preferably provided with a plurality of heads or rings, that there can be no vibration or chatter between the stylus arm 18 and the diaphragm 12, and by the securing of the extension 3 upon the tube 5,

by frictional means or its equivalent, in lieu of the bayonet joint generally employed, there is in no instance whatever, in my present invention, any opportunity for any mechanical, scratchy, metallic or grinding noises to be reproduced or created during the sound reproducing operation of my device.

So far as I am aware, I am the first in the art to produce a sound box of the character described out of rubber or similar material, having portions thereof of varying degrees of hardness, for the purpose stated, and my claims to my novel product, as well as my claims to the method of making the same, are to be construed with the corresponding score awarded to a pioneer invention. I also desire to call attention to the manner in which the terminal 34 of the sound conveying tube 5 is seated against the shoulder 35, in the sound box body 2, these parts being united in such a way that the opening or passage 15 is of substantially the same diameter as the inner bore of the tube 5, so that the sounds are not broken or interrupted by any sharp angles formed by the union of the tube 5 and body portion 2. the effect of which is evident. I furthermore provide an extended, frictional bearing for the tube 5 within the extension 3 of the sound box, so that after these parts are once properly assembled with respect to each other, they will not readily become displaced. The neck 3 may be semi-cured or slightly softer than the body portion 2, if desired, so as to snugly hug the contiguous portion of the tube 5.

It will now be apparent that I have devised a novel and useful construction of a sound box for talking machines, graphophones, gramophones and the like, which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will be found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars, without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. As an improved article of manufacture, a one-piece sound box body composed of resilient material, the front annular portion of which is adapted to surround the periphery of a diaphragm and is softer than the other portions of said sound box body, for the purpose described.

2. A sound box body having a thickened rear wall and a front, annular, peripheral bead, secured to said wall by an annular, in-



tegral, resilient hinge, said bead encircling a diaphragm seat, and being capable of vibration independently of said body portion.

3. A sound box body having a thickened rear wall, and a front, annular, peripheral bead, of softer material than said body, said bead being provided with an annular, internal diaphragm seat, said bead and its seat being integral with said body and being capable of vibrating independently of said body.

4. As an improved article of manufacture, a one-piece sound box body made from rubber, said body having a front peripheral bead thereon encircling an annular seat for a diaphragm, and said body having an internal chamber in the rear of said diaphragm seat of greater diameter than the latter, said bead and seat being secured to said body by an annular, resilient, integral hinge, permitting vibration of said bead.

5. A sound box body having a thickened rear wall, a front, annular bead of softer material than said body, and provided with an annular diaphragm seat, said bead and its seat being integral with said body and being capable of vibrating independently of said body, and a diaphragm seated in said seat within said bead and capable of vibration in unison with said bead.

6. The combination of a diaphragm and a one-piece sound box body composed of resilient material of varying degrees of hardness, the portion of said box body encircling said diaphragm being softer than said body in the rear of said diaphragm.

7. The combination of a diaphragm, a one-piece sound box body composed of resilient material of varying degrees of hardness, the portion of said box body encircling said diaphragm and in which said diaphragm has its seat being softer than the other portions of said body in the rear of said diaphragm, said diaphragm seat being secured to said body by an annular, resilient, integral hinge, a stylus arm having its terminal located in an aperture in said diaphragm, and a mass of cementing material common to said terminal and said diaphragm, whereby the latter are secured, so as to vibrate in unison but out of contact with each other.

8. The combination of a sound box body of hard rubber, a front annular bead therein of softer rubber having a diaphragm seat therein, and an annular, resilient, integral hinge common to said bead and sound box body.

9. The combination of a sound box body of hard rubber, a front annular bead therein, of softer rubber, having a diaphragm seat therein, an annular, resilient, integral hinge common to said bead and sound box body, and a diaphragm secured in said seat.

10. A sound box body having a front an-

nular bead thereon, said bead being provided with converging walls whereby a diaphragm seat is formed, said body having a chamber in the rear of said bead formed of converging walls, said last mentioned chamber being of greater diameter than said diaphragm seat, in combination with a diaphragm secured in said diaphragm seat, a stylus arm having its terminal located within an aperture in said diaphragm, and a body of cementing material common to said terminal and diaphragm, whereby the two latter are held in juxtaposition but out of contact with each other.

11. A sound box body having a front annular bead thereon, said bead being provided with side walls, whereby a diaphragm seat is formed, said body having a chamber in the rear of said bead, formed with converging walls, said last-mentioned chamber being of greater diameter than said diaphragm seat, and said bead and body being connected by an annular integral hinge.

12. A sound box body having a front annular bead thereon, said bead being provided with annular converging walls, whereby a diaphragm seat is formed, said body having a chamber in the rear of said bead, formed with converging walls, said last mentioned chamber being of greater diameter than said diaphragm seat, and said bead and body being connected by an annular integral hinge, in combination with a diaphragm secured in said diaphragm seat.

13. As an improved article of manufacture, a one-piece sound box body, the front annular portion thereof being adapted to surround and encircle a diaphragm, and a hollow rearward integral extension on said body softer than the latter and provided with an internal, annular rib adapted to engage a reproducer tube.

14. As an improved article of manufacture, a one-piece sound box body having a thickened rear wall, a front annular, peripheral bead having a diaphragm seat therein integral with said body, and a rearward hollow extension on said body, said extension and bead being both softer than said body.

15. A sound box body having a thickened rear wall and a front, annular, peripheral bead secured to said wall by an annular, integral, resilient hinge, said bead encircling a diaphragm seat and being capable of vibration independently of said body portion, and a rearward hollow extension on said body softer than said body.

16. As an improved article of manufacture, a one-piece sound box body, the front annular portion thereof being adapted to surround and encircle a diaphragm, and being softer than said sound box body, and a hollow, rearward extension on said body also softer than the latter.



17. The combination of a sound box body having an integral diaphragm seat softer than said body, a diaphragm in said seat, a stylus arm having its terminal located in an aperture near the center of said diaphragm, but entirely out of contact therewith, and a mass of cementing material, common to said terminal and diaphragm, whereby the two latter are secured. so as to vibrate in unison but out of contact with each other.

18. As an improved article of manufacture, a one-piece sound box body, the front, annular portion thereof being adapted to surround and encircle a diaphragm, and being softer than said sound box body, a hollow, rearward extension on said body also softer than the latter, and lugs projecting from said body and integral therewith, adapted for the reception of cushioning devices for the stylus holder.

19. The combination of a sound box body, a diaphragm mounted in a seat therein, a stylus arm having its terminal provided with a plurality of heads, said terminal being located in an aperture near the center of said diaphragm, and said heads being on either side of said diaphragm said terminal being entirely out of contact therewith, and a mass of cementing material common to said terminal and diaphragm, whereby the two latter are secured so as to vibrate in unison but out of contact with each other.

20. In a sound box for talking machines, a body portion having lugs thereon, threaded stems having a smooth portion freely movable in bearings in said lugs, a stylus holder intermediate said bearings, bearings of hard material on each side of said stylus holder, the juxtaposed ends of said threaded stems being in engagement with said bearings, nuts on said threaded stems intermediate of said lugs and said bearings, cushioning devices intermediate said lugs and said nuts, nuts on the outer portions of said threaded stems, and cushioning devices intermediate said outer nuts and said bearings.

21. In a sound box for talking machines, a body portion having lugs thereon, threaded stems having a smooth portion movable in bearings in said lugs, a stylus holder intermediate said bearings, jeweled bearings on each side of said stylus holder, the juxtaposed ends of said threaded stems being pointed and engaging seats in said jeweled bearings, nuts on said threaded stems intermediate of said lugs and said jeweled bearings, tension devices intermediate said lugs and said nuts, nuts on the outer portions of said threaded stems, and tension devices intermediate said outer nuts and said bearings.

22. The combination of a reproducer tube

and a one-piece sound box body, the front, annular portion thereof being adapted to surround and encircle a diaphragm, and a hollow, rearward, integral extension on said body softer than the latter and provided with an internal, annular rib adapted to engage said reproducer tube, said body having an internal recess in which the terminal of said reproducer tube is seated, the diameter of the bore through said body being substantially the same as and in alinement with the inner bore in said reproducer tube.

23. In a sound box for talking machines, a body portion having lugs thereon, threaded stems having juxtaposed pointed ends and a smooth portion freely movable in said lugs, a stylus holder intermediate said pointed stems, bearings formed in opposite sides of said stylus holder in which said pointed ends are seated, adjusting devices on said stems intermediate of said lugs and bearings, cushioning devices intermediate said lugs and adjusting devices, nuts on the outer portion of each of said stems and cushioning devices intermediate said outer nuts and lugs.

24. The combination of a diaphragm, a sound box body composed of resilient material, the front annular portion thereof being adapted to surround the periphery of said diaphragm and being integral with and softer than the body portion of said sound box, a stylus arm having its inner end secured to said diaphragm, and cushioning devices carried by said body, the outer portion of said stylus arm being supported by said cushioning devices.

25. The combination of a diaphragm, a sound box body composed of resilient material, the front annular portion thereof being adapted to surround the periphery of said diaphragm and being integral with and softer than said body, a stylus arm having its inner end secured to said diaphragm, lugs also integral with said body, and supporting devices for the outer portion of said stylus arm carried in said lugs.

26. The combination of a diaphragm, a sound box body composed of resilient material, the front annular portion thereof being adapted to surround the periphery of said diaphragm, and being integral with and softer than said body, a stylus arm having its inner end secured to said diaphragm, lugs also integral with said body, supporting devices for the outer portion of said stylus arm carried by said lugs, and a rearward hollow extension on said body of softer material than said body and adapted to engage a suitable support.

ALVA D. JONES.

Witnesses:

E. HAYWARD FAIRBANKS,

C. D. McVAY.





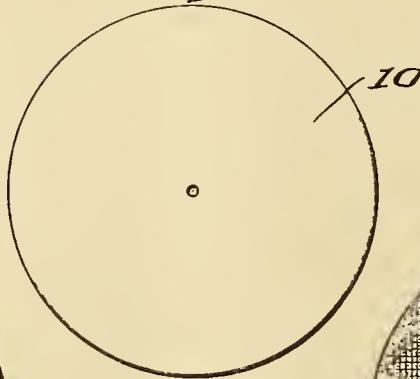


J. W. OWEN & A. HEWITT.  
 DIAPHRAGM.  
 APPLICATION FILED JAN. 25, 1912.

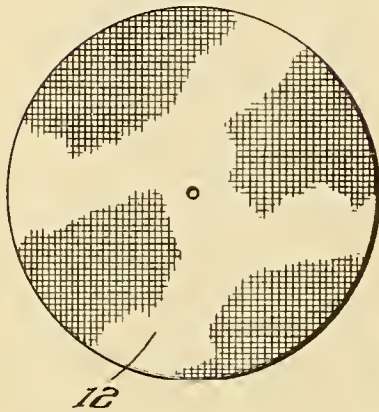
1,118,675.

Patented Nov. 24, 1914.

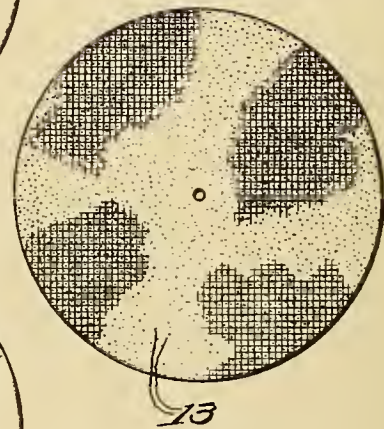
*Fig. 1.*



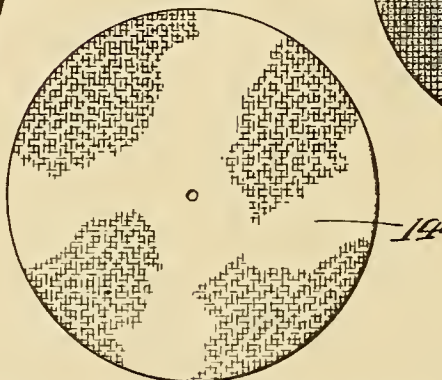
*Fig. 2.*



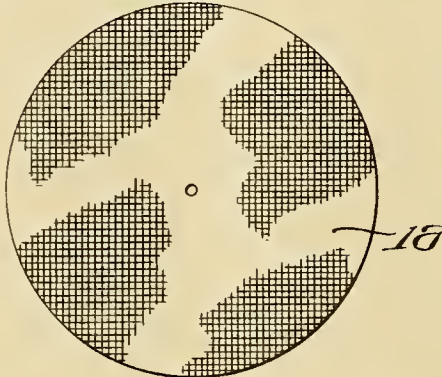
*Fig. 3.*



*Fig. 4.*



*Fig. 6.*



*Fig. 8.*



WITNESSES

*F. J. Hartmann.*  
*Clifton C. Hallowell*

BY

INVENTORS.  
*James W. Owen.*  
*Albert H. Hewitt.*  
*Horace B. [Signature]*  
 ATTORNEY



# UNITED STATES PATENT OFFICE.

JAMES W. OWEN, OF LANSDOWNE, PENNSYLVANIA, AND ALBERTIS HEWITT, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## DIAPHRAGM.

1,118,675.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Application filed January 25, 1912. Serial No. 673,444.

*To all whom it may concern:*

Be it known that we, JAMES W. OWEN, a citizen of the United States, and a resident of Lansdowne, in the county of Delaware, State of Pennsylvania, and ALBERTIS HEWITT, a citizen of the United States, and a resident of Camden, county of Camden, State of New Jersey, have invented certain new and useful improvements in Diaphragms, whereof the following is a specification, reference being had to the accompanying drawing.

This invention particularly relates to diaphragms for sound recording and reproducing devices, such as are preferably adapted to talking machine construction.

The principal objects of this invention are, to provide a diaphragm that will respond with perfect clearness to the most delicate vibrations, irrespective of any atmospheric changes, and that will accurately record and reproduce both the high and low tones and the included range with equal effect; and to provide a diaphragm which not only has the characteristics essential to the best reproduction of clear, loud and distinct tones, but combines therewith durability and stability, together with cheapness of manufacture in any desired quantities.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawing, Figure 1 is a front elevational view of the simplest form of this invention; Fig. 2 is a front elevational view of a diaphragm formed of fine woven fabric; Fig. 3 is a view similar to Fig. 2, showing the fabric treated with an electrically conductive material; Fig. 4 is a view similar to Figs. 2 and 3, showing the fabric diaphragm having an integument of metal; Fig. 5 is a fragmentary transverse sectional view of the diaphragm shown in Fig. 4; Fig. 6 is a front elevational view of a diaphragm similar to the diaphragm shown in Fig. 2, but of a relatively coarser fabric; Fig. 7 is a fragmentary transverse sectional view of the diaphragm shown in Fig. 6 showing its interstices provided with a filling, and Fig. 8 is a fragmentary transverse sectional view similar to Fig. 7, showing a dermatoid metallic integument formed therewith.

It is well known that in the production of diaphragms formed of mica, considerable waste is necessary in producing such diaphragms of the proper size and thickness, and in diaphragms formed of sheet metal it is difficult to produce diaphragms of absolutely uniform thickness and tension; whereas diaphragms constructed in accordance with the present invention, by an electrolytic process, may be produced with absolute uniformity.

It has been found by extensive experiment that diaphragms formed by electro-deposition produce a tone of superior quality, which may be by reason of the fact that the plating operation does not produce a difference of tension at different regions or upon opposite sides of the diaphragm, or in other words the strains, if any, are equally distributed.

The simplest form of this invention is shown in Fig. 1 of the drawing, wherein the diaphragm 10 is formed of electrically deposited metal *per se*, preferably nickel, which is produced by electroplating a polished surface, and then stripping the electrically deposited metal therefrom, thus forming a thin uniform diaphragm which is wholly composed of integrated particles of metal coalesced by electrical deposition.

The form of this invention shown in Figs. 2 to 5 inclusive comprises a composite diaphragm which is preferably formed of a silk fabric body or base 12, shown in Fig. 2, which may be immersed in water or other suitable adherent, and coated with a powder of an electro-conductive material which although indicated by the speckles 13 in Fig. 3, may be of a very fine powder or even liquid. The silk diaphragm body or base thus coated may then be immersed in an electroplating bath, preferably nickel, and provided with a dermatoidal electroplating 14 of the metal desired, the plating on the opposite faces being preferably united in integral relation through the interstices between the threads 15 of the woven body or base, as shown at 16, as best shown in Fig. 5.

The form of this invention shown in Figs. 6 to 8 inclusive comprises a diaphragm formed of a relatively coarse fabric 18, as shown in Fig. 6, which may be treated with silicate of soda (water glass) or other suitable material, for providing a filling 20 for



the interstices between the adjacent threads 21 forming the fabric, after which a coating of electrically conductive material is provided and the composite diaphragm thus 5 formed plated with nickel 22, or any desired material which is suitable for the purpose desired, and which is especially adapted to be substantially unaffected by atmospheric changes.

10 It will be obvious from the foregoing description that diaphragms formed in accordance with this invention may be both flexible and light and capable of responding to any and all vibrations, and quickly regaining 15 its equilibrium, yet be exceedingly stable.

20 In view of the numerous forms of diaphragms which may be produced in the manner above set forth, it is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is believed that various modifica- 25 tions may be made without departing from the essential features of the invention as defined in the appended claims.

25 Having thus described our invention, we claim:

30 1. A diaphragm for sound recording and reproducing machines embodying in its construction a non-metallic base and a sheet of electrodeposited metal intimately united thereto.

35 2. A diaphragm for sound recording and reproducing machines embodying in its construction a sheet of non-metallic material having an electroplating of nickel formed thereon and substantially covering a face thereof.

3. A diaphragm for sound recording and

reproducing machines embodying in its construction a textile fabric base, and an integument of electrodeposited metal united thereto. 40

4. A diaphragm for sound recording and reproducing machines comprising in its construction, a textile fabric base, and a sheet 45 of electrodeposited metal intimately united thereto.

5. A diaphragm for sound recording and reproducing machines comprising in its construction a textile fabric base, and a sheet of 50 electrodeposited metal unitarily secured thereto and covering one side thereof.

6. A diaphragm for sound recording and reproducing machines, comprising a fabric base, and an electro-plate of metal united 55 thereto.

7. A diaphragm for sound recording and reproducing machines, comprising in its construction a textile fabric plated with metal.

8. A diaphragm for sound recording and 60 reproducing machines, embodying in its construction a textile fabric having an electroplate of metal joined through its interstices.

9. A diaphragm for a sound recording and reproducing machine embodying in its construction a sheet of non-metallic material, and a sheet of electrodeposited metal unitarily secured thereto. 65

In witness whereof, we have hereunto set our hands this 22nd day of January, A. D. 70 1912.

JAMES W. OWEN.  
ALBERTIS HEWITT.

Witnesses:

FRANK B. MIDDLETON, Jr.,  
JOHN D. MYERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





C. L. HIBBARD.  
TALKING MACHINE.  
APPLICATION FILED FEB. 14, 1914.

1,118,902.

Patented Nov. 24, 1914

Fig. 1.

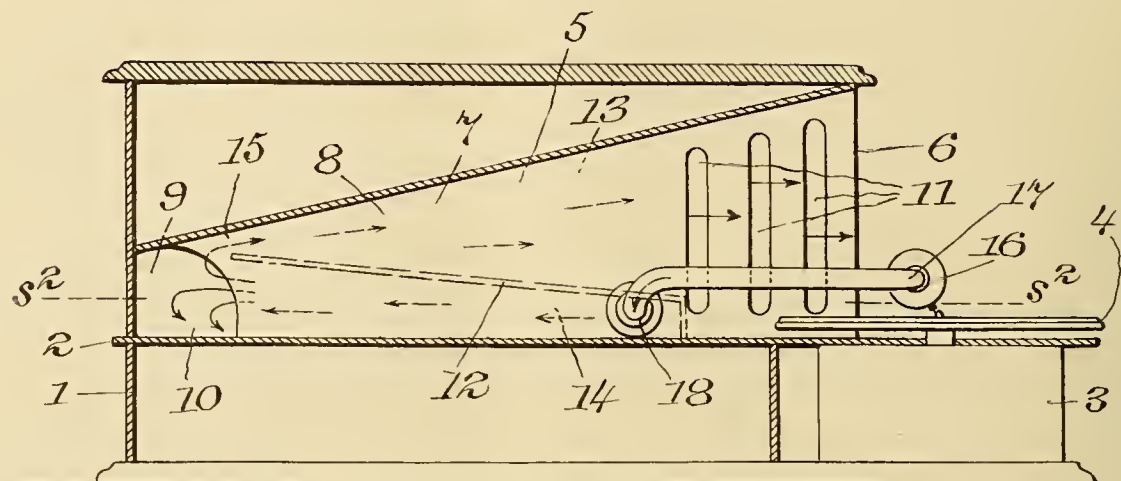
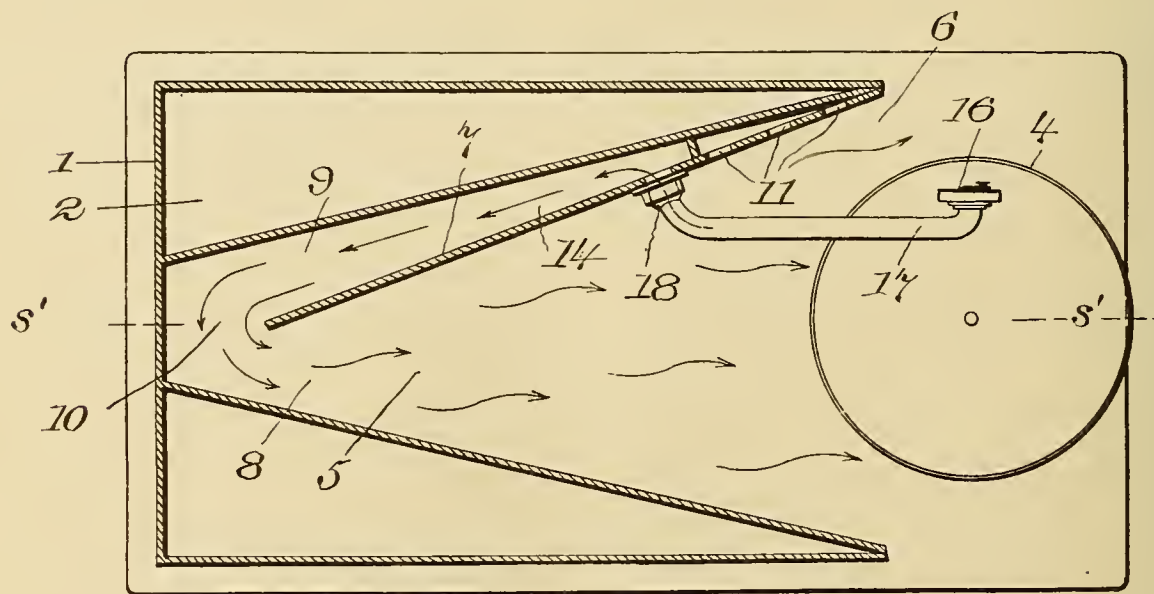


Fig. 2.



Witnesses  
J. H. Janny  
D. J. Bunnels

Inventor  
Charles L. Hibbard  
By Eugene Pearl  
his Attorney

# UNITED STATES PATENT OFFICE.

CHARLES L. HIBBARD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF  
TO FREDERICK W. HAGER, OF PHILADELPHIA, PENNSYLVANIA.

## TALKING-MACHINE.

1,118,902.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Application filed February 14, 1914. Serial No. 818,705.

*To all whom it may concern:*

Be it known that I, CHARLES L. HIBBARD, a citizen of the United States of America, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates generally to talking machines and has particular reference to the construction and arrangement of the sound amplifier employed in connection therewith.

The object of the invention is to simplify and reduce the cost of the machine, and at the same time give the reproduced sound improved tone quality and greater volume and clearness.

The accompanying drawings will serve to illustrate a construction suitable for carrying my invention into effect. I wish it understood, however, that I do not limit myself to either the exact form or details shown, as various changes may be made therein without departing from the spirit and scope of the invention.

In the drawings—Figure 1 is a central longitudinal section, taken on the line S<sup>1</sup>, S<sup>1</sup> of Fig. 2 and Fig. 2 is a horizontal section, taken on the line S<sup>2</sup>, S<sup>2</sup>, of Fig. 1.

Referring now to the drawings, 1 represents the outer casing or cabinet of the machine, which is divided into two compartments by a horizontally disposed partition 2. In a forward extension of the lower compartment there is a motor 3 arranged to drive a turntable 4 mounted above the partition 2 and exteriorly of the casing for convenience in placing records in position thereon and removing them. The lower compartment proper *i. e.* that part in the rear of the motor section, may be used if desired, for the storage of records, etc. The upper compartment of the casing is shaped interiorly to serve as a sound amplifier and comprises a chamber 5, which extends throughout the entire length of the compartment and gradually enlarges from the rear to the full dimensions of the opening 6 in the front thereof, through which opening the reproduced sound passes outward from the amplifier. The chamber 5 is divided longitudinally by a vertically disposed partition 7, into two sound passages 8 and 9, which communicate at their ends

through openings 10 and 11. Within the smaller passage 9, a partition 12, slightly inclined to the horizontal, is arranged to subdivide the passage 9 into two sections 13 and 14, which taper in opposite directions and communicate at one end, near the rear of the machine, through an opening 15. A sound reproducer 16, adapted to cooperate with a record on the turntable in the usual manner, is connected with the smaller end of the passage 14, by means of a tone-arm 17, mounted at 18, in a manner well known in the art, to have free movement in vertical and horizontal planes.

In the several views of the drawings, the course of travel of sound from the reproducer to the point of delivery at the front of the machine, is indicated by arrows. As shown, the sound passes first through the tone-arm 17, to the smaller end of the passage 14. Continuing rearwardly through the same, it enters the main section 8 and the auxiliary section 13 of the amplifier proper, by which it is conducted forwardly and delivered through the opening or opening 6 of the upper compartment 5, the sound from the auxiliary section 13 of the amplifier, entering the main section 8 thereof through the openings 11, as above described.

Having, therefore, described my invention, I claim:

1. In a talking machine, a casing, a sound amplifier comprising a chamber extending and gradually enlarging from the rear to the front of the casing, a vertical partition dividing the chamber into two communicating passages for sound, a transverse partition subdividing one of the passages into two connected sections enlarging in opposite directions, sound reproducing means mounted exteriorly of the casing, and a movable tone-arm interposed as a connection between the sound reproducing means and the sound amplifier.

2. In a talking machine, a casing, a sound amplifier comprising a chamber extending and gradually enlarging from the rear to the front of the casing, a partition dividing the chamber longitudinally into two sound passages communicating at or near both ends, one of the passages being further divided in the direction of its length forming two sections opening one into the other and enlarging in opposite directions, sound



reproducing means mounted exteriorly of the casing, and a movable tone-arm interposed as a connection between the sound reproducing means and the sound amplifier.

5 3. In a talking machine, a casing, a sound amplifier comprising a chamber extending and gradually enlarging from the rear to the front of the casing, a partition dividing the chamber longitudinally into two sound  
10 passages communicating at or near both ends, one of the passages being of less cross sectional area than the other and further

divided lengthwise into two sections enlarging in opposite directions and opening one into the other at the rear of the casing, 15 sound reproducing means and a movable tone-arm interposed as a connection between the sound reproducing means and the sound amplifier.

CHARLES L. HIBBARD.

Witnesses:

FREDERIC W. HAGER,  
ANDREW SETARS.

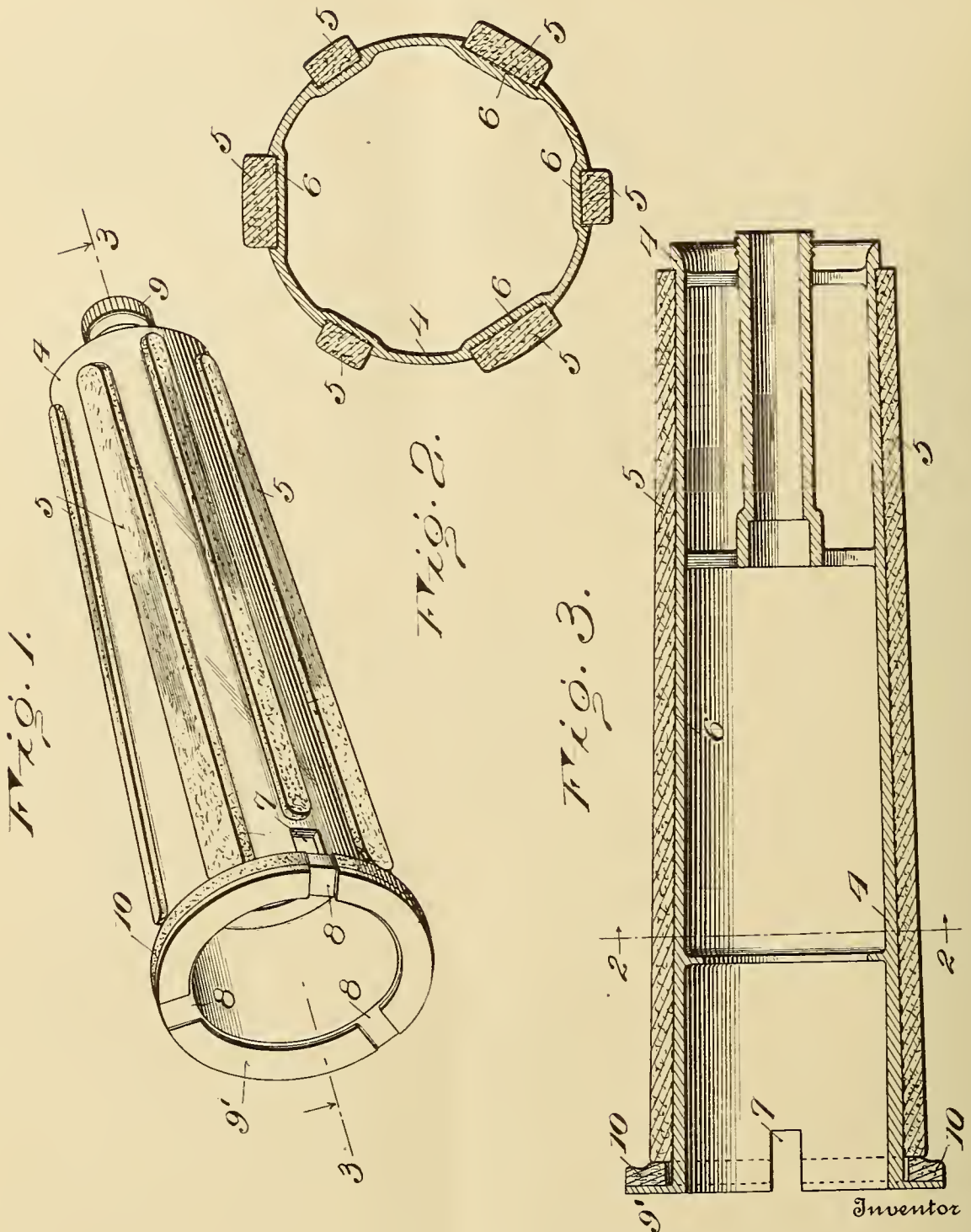
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.  
Washington, D. C."



F. L. CAPPS.  
 MANDREL FOR SOUND RECORDS.  
 APPLICATION FILED SEPT. 4, 1913.

1,119,064.

Patented Dec. 1, 1914.



Witnesses  
 Jas. H. Anderson  
 C. E. Warfield

Frank L. Capps,  
 By  
 Mauro. Cameron. Lewis & Massie  
 Attorneys



# UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## MANDREL FOR SOUND-RECORDS.

1,119,064.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed September 4, 1913. Serial No. 788,178.

*To all whom it may concern:*

Be it known that I, FRANK L. CAPPS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Mandrels for Sound-Records, which invention is fully set forth in the following specification.

This invention relates to talking machines, and more particularly to mandrels employed in such machines for supporting and revolving the records. It is usual to make such records with a cylindrical exterior surface and a slightly conical shaped interior, to the end that the records may be slipped onto a tapering or slightly conical mandrel. The interior dimensions of the records and the exterior dimensions of the mandrel will vary slightly, either through variations in the manufacture, or by reason of the fact that they expand and contract under changing degrees of temperature; but the conical or tapering shape of the mandrel and the corresponding shape of the interior of the record enable the record to be pushed far enough on the mandrel to fit the same and engage it with sufficient friction to enable it to be driven thereby. But if the mandrel is slightly larger or smaller than the standard; if the record itself is slightly larger or smaller than the standard sizes; or if the mandrel and record are made exactly of the standard size at one temperature, and their dimensions have been varied by reason of changes of temperature, the record when placed upon the mandrel will not always occupy exactly the same position longitudinally of the mandrel. A large record will be slipped farther upon a given mandrel than a small record, and a given record will be slipped farther onto the mandrel when the parts are expanded by high temperature than would be the case with a low temperature. Moreover, the standard mandrels are made of metal, and the coefficient of expansion and contraction of the metal differs from that of the wax or wax-like material of which the record is made, and if the record is left upon the mandrel under a high degree of temperature, and the temperature then falls, the contraction of the record being greater than that of the mandrel, the record will be split and destroyed. Again, even in carefully constructed machines, the vibrations of the machine are transmitted through the mandrel to the record, which introduces more or less inac-

curacy in the action of the machine, either in recording or in reproducing.

The matter of varying positions of the record upon the mandrel is one of marked importance in some classes of machines, such for example, as those used for dictation purposes, wherein correction devices are employed, in which the position of the record with relation to the correction device plays an important part, and it has therefore been found desirable to provide a fixed stop against which the record is abutted at one end, to exactly and accurately determine its position on all machines. With a metallic mandrel, this exact position could not be obtained with all records and with varying degrees of temperature, for the reasons indicated above. Furthermore, it is desirable to provide some means for starting the record loose from the mandrel when the same is to be removed, and such means generally occupy a fixed position upon the machine, and any variation in the position of the record on the mandrel militates against the efficient operation of such loosening or "ejecting" devices, as they are called.

One of the objects of the present invention is to provide a mandrel for a talking machine on which the sound records may be readily placed and securely held in position, but from which they can be more readily removed than heretofore.

A further object is to provide a mandrel of this character with means for acoustically insulating the record from the mandrel.

With these objects in view, the invention consists in providing a tapering mandrel, preferably of metal, with a series of longitudinally extending ribs of some yielding material, which will acoustically insulate the metal of the mandrel from the record. The ribs must be of a material which will not only afford the acoustic insulation desired, but which will afford a secure hold upon the interior of the record, so as to cause it to revolve with the mandrel without any slipping, and which, nevertheless, will yield sufficiently to enable the mandrel to compress it to a material extent, to enable each and every record to be forced onto the mandrel to the exact position required. I have discovered that a compact felt is a most excellent material from which to con-



struct said ribs. The felt affords a firm grip on the interior of the record; it acoustically insulates the record from the metal mandrel; and when in the form of 5 ribs, it yields sufficiently to enable the record, even though of slightly diminished interior diameter, to be forced home to the desired position. I give the felt or other similar yielding material the form of ribs, 10 since the material, when formed in the shape of long narrow strips or ribs, will yield much more readily than would be the case if an entire cylinder of felt or other similar material surrounded the mandrel. 15 The ribs expand laterally under the pressure of the record, whereas if an entire cylinder or coating of yielding material were employed, it would simply be compacted by the record when forced thereon. This 20 would result in a much less desirable and less flexible element, and at an increased cost, since it would involve the use of more than double the amount of material.

The invention will be best understood by 25 reference to the accompanying drawings, which illustrate one expression of the inventive idea, and in which—

Figure 1 is a perspective view; Fig. 2 is a cross-section on the line 2—2 of Fig. 3; 30 and Fig. 3 is a longitudinal section on the line 3—3 of Fig. 1.

Referring to the drawings, wherein like reference numerals indicate like parts, 4 is a tapering metallic mandrel, the outer surface of which is provided with projections 5, preferably in the form of equally spaced longitudinal ribs of yielding, acoustically insulating material, such as a well-compacted felt. Such ribs are secured to the mandrel in any desired manner, preferably by 40 means of cement, and if desired, may be located in depressions or recesses 6 provided in the mandrel.

The mandrel 4 is preferably provided 45 with a plurality of slots 7 in each of which a finger 8, forming part of an ejecting device, is located, said fingers 8 having longitudinal movement from left to right imparted thereto upon the rotation of a turn screw 50 9 operating through suitable mechanism, not shown. This construction is not claimed herein, since the same forms the subject-matter of a separate application filed of even date herewith. Further, the mandrel 4 is 55 preferably provided at its inner left-hand end with an outwardly projecting flange 9', to which is secured a body 10 of yielding, acoustically insulating material, preferably of the same felt which constitutes the ribs 5. 60 This body or ring 10 of felt is interposed between the ends of the ribs 5 and the flange 9', and when the tablet is in position on the mandrel, the inner end of the tablet

bears against the ring 10, which thus serves to exactly position the record tablet longitudinally of the mandrel. 65

It will be observed that if a record tablet whose internal diameter was slightly less than the standard were placed upon the mandrel, the ribs 5 would yield laterally when 70 the tablet was forced home, thus permitting the tablet to be forced snugly against the stop composed of the felt ring 10, and this position would enable the ejecting device to operate thereon with certainty; would enable the correction device to occupy its 75 proper relation thereto:—and all without imposing any undue strain upon the record, either in placing it upon the mandrel or in case of expansion and contraction, due to 80 changes in temperature. In addition to this, the record would always be acoustically insulated from the metal of the mandrel.

The inventive idea is susceptible of various mechanical expressions, the limits of the 85 invention being defined in the appended claims.

What is claimed is:—

1. A tapering mandrel for sound records provided with longitudinally extending 90 spaced projections of a yielding, acoustically insulating material.

2. A tapering mandrel for sound records provided with longitudinal ribs of felt extending above the surface thereof. 95

3. A tapering metallic mandrel for sound records provided with longitudinal ribs of felt held in depressions in said mandrel and extending above the surface thereof.

4. A tapering metallic mandrel for sound 100 records provided with an outwardly extending flange, ribs of felt arranged longitudinally of said mandrel and extending above the surface thereof, and a body of yielding sound insulating material arranged between 105 said ribs and said flange.

5. A tapering metallic mandrel for sound records provided with an outwardly extending flange, ribs of felt arranged longitudinally of said mandrel and extending above 110 the surface thereof, and a body of felt arranged between said ribs and said flange.

6. A tapering metallic mandrel for sound records provided with longitudinal ribs of felt held in depressions in said mandrel and 115 extending above the surface thereof and having an end stop of yielding material for said records.

In testimony whereof I have signed this specification in the presence of two subscribing 120 witnesses.

FRANK L. CAPPS.

Witnesses:

JOHN S. GRIFFITH,

L. S. EASTMAN.

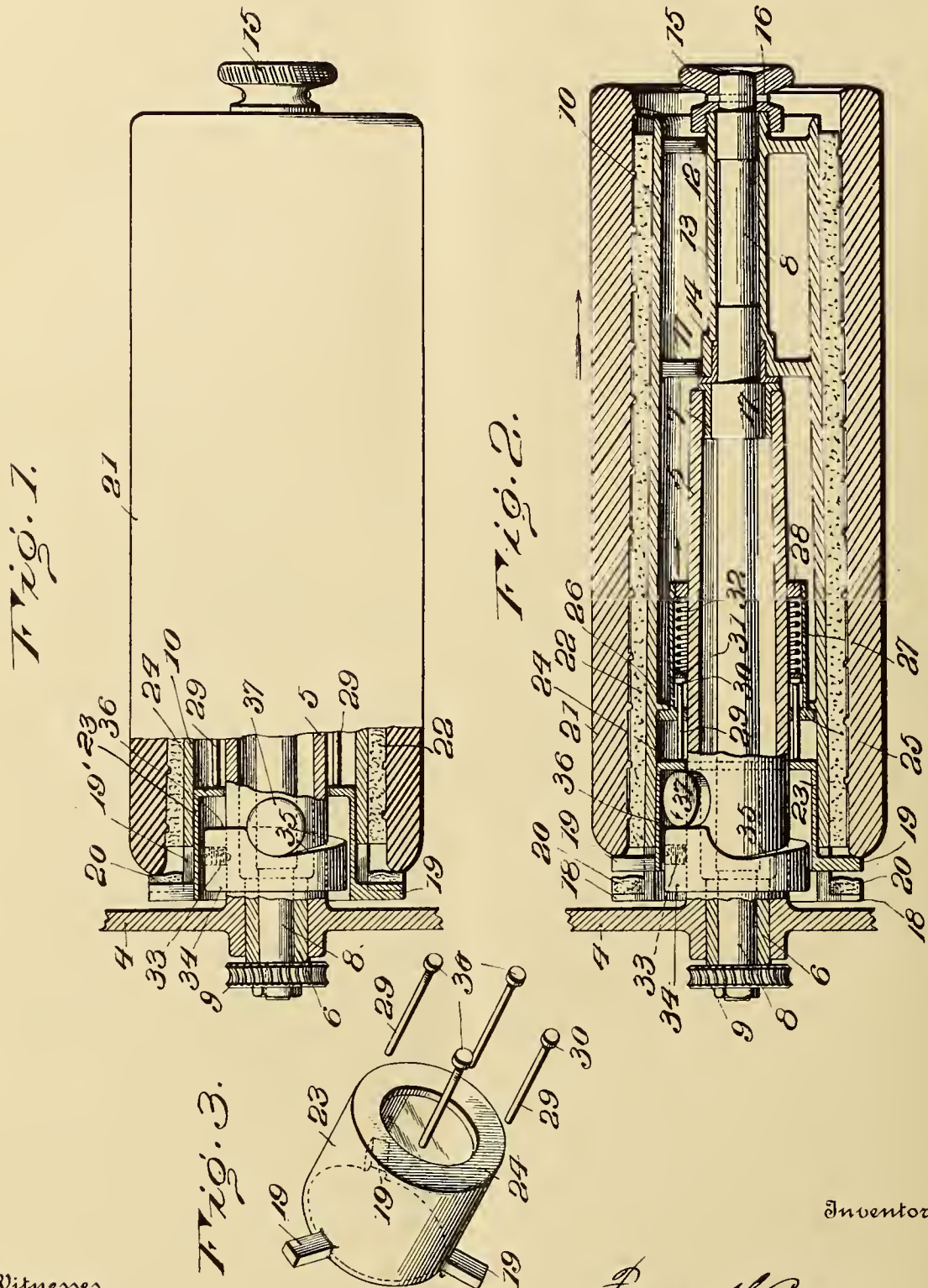




F. L. CAPPS.  
 EJECTOR MECHANISM FOR CYLINDRICAL RECORDS.  
 APPLICATION FILED SEPT. 4, 1913.

1,119,065.

Patented Dec. 1, 1914.



Witnesses  
 Jas. H. Anderson.  
 C. E. Warfield

Inventor  
 Frank L. Capps.  
 By  
 Mauro. Cameron. Lewis Massie  
 Attorneys

# UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## EJECTOR MECHANISM FOR CYLINDRICAL RECORDS.

1,119,065.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed September 4, 1913. Serial No. 788,179.

*To all whom it may concern:*

Be it known that I, FRANK L. CAPPS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Ejector Mechanism for Cylindrical Records, which invention is fully set forth in the following specification.

The present invention relates to talking machines, and particularly to ejector mechanism for removing the cylindrical records and blanks from the mandrel.

The object of the present invention is to provide a simple device which may be readily manipulated and which will be durable and effective in operation, the parts of which are compact and out of the way, said parts being readily assembled and disassembled.

In talking machines employing a cylindrical form of records or tablets, the mandrel of the machine and the interior of said records or tablets have a slight taper. When the record or tablet is in operative position, it fits tightly upon the mandrel and revolves therewith, but a slight longitudinal movement of the tablet tends to free it from frictional contact with the mandrel, and it may then be readily removed by hand. The tablet must fit firmly on the mandrel when in operative position, and being of wax or wax-like material, is liable to be broken or injured in imparting the initial longitudinal movement thereto to remove it from the mandrel. It has heretofore been proposed to effect this initial or loosening longitudinal movement by means of lever mechanism which is open to several objections. It is liable to damage the tablet, is more or less inefficient, and is in an exposed position where it is in the way of the operator in manipulating the machine.

The object of the present invention is to provide an efficient means for imparting the initial or starting movement to the tablet, which means shall be free from the objections above indicated, and with this object in view, the invention consists, generally stated, of a member placed preferably within the interior of the mandrel revolving therewith but capable, under certain conditions, of longitudinal movement with relation to the mandrel and provided with an outwardly projecting member or members for engaging the record during said

longitudinal movement and imparting the initial or starting movement thereto.

The invention will be better understood by reference to the accompanying drawings, illustrating one expression of the inventive idea, and wherein,

Figure 1 is an elevation, partly in section, of the mandrel, the record mounted thereon, and the means for ejecting the record from the mandrel, the parts being in the position which they occupy during the normal operation of the machine, that is to say, when a record is being made or reproduced; Fig. 2 is a view similar to Fig. 1, except that the parts are shown in the position which they occupy after the ejector mechanism has been operated, and when the cylinder may be readily removed by introducing the hand in the end thereof which projects off of the mandrel; and Fig. 3 is a detail perspective showing the record-engaging members and associated parts.

Referring to the drawings, wherein like reference numerals in the several figures indicate like parts, 4 is part of the motor casing to which is connected, preferably integrally, an extended tubular bore 5. Within the casing 4 is mounted a bushing 6 and within the bore 5 a bushing 7, through which bushings passes the shaft 8 which is rotated by a worm 9, and on which shaft the mandrel 10 is mounted. This mandrel is provided on its interior with spiders 11 and 12 connected by a sleeve 13, said sleeve carrying a bushing 14 with which shaft 8 also engages, and having a portion projecting beyond spider 12 on which portion is screw-threaded a thumb-nut 15 which is secured to shaft 8 by a pin 16 projecting through a perforation in said shaft 8. When the pin 16 is in place, it will be appreciated that shaft 8 is prevented from moving toward the left, and in order to prevent the shaft from moving toward the right, it is provided with an enlargement at 17, which enlargement engages bushings 7 and 14.

At its inner end the mandrel 10 is provided with an outwardly projecting flange 18, the mandrel and said flange being slotted at a plurality of points to permit of movement longitudinally of said mandrel of members 19 which engage the inner end of the record and are operated to move said record longitudinally of the mandrel. Dur-



ing the normal operation of the machine, that is to say, when a record of sound is being recorded on a blank or reproduction is being effected, the parts are in the position indicated in Fig. 1, the inner end of the record contacting with the layer 20 of felt or other suitable material which is secured to the flange 18, the record-engaging members 19 at this time being out of engagement with the end of the cylindrical tablet. Preferably, this cylindrical record, which is herein designated by the numeral 21, is supported by a plurality of ribs of felt 22, or other suitable yielding material, so that the record may be readily removed from the mandrel and in order that all danger of breaking the record, due to its expansion and contraction under the influence of heat, may be obviated.

The record-engaging members (here shown as three) are preferably integrally secured to a sleeve 23 surrounding the bore 5 and provided with an inturned flange 24 which is movable longitudinally in engagement with said bore. An annular member or ring 25 also rests upon said bore 5 and is prevented from moving toward the right (Fig. 2) by lugs 26 projecting inwardly from the mandrel 10. This ring is provided with an extended barrel 27 preferably formed integral therewith, an annulus 28 being screwed in the end of said barrel and bearing upon the bore 5. A plurality of pins 29, here shown as four in number, pass through apertures in the ring 25, the heads 30 of said pins projecting into the barrel 27 and engaging a washer 31. A coiled spring 32 bears upon said washer at one end and against the annulus 28 at the other end.

Mounted securely upon the bore 5 and securely fixed thereto by a screw 33 is a cam 34 provided with a cut-out portion 35 and a flat or straight portion 36. A movable element 37, here shown in the form of a disk, is continuously held in engagement with the surface of said cam on the one hand and with the flange 24 on the other hand by the action of spring 32. When the disk 37 occupies the position shown in Fig. 1, the parts are in the position which they occupy when a record of sound is being recorded on a blank or reproduction is being effected, and when the disk 37 is in the position indicated in Fig. 2, the record-engaging members 19 have moved longitudinally to displace the sound record so that the right-hand end thereof projects away from the mandrel. The operation of the device is as follows:

Under normal operative conditions the mandrel rotates in clock-wise direction, the parts being in the position indicated in Fig. 1. When it is desired to remove the record from the mandrel, the machine is stopped and the operator gives a twirl in a counter

clock-wise direction to the nut 15 which is screwed onto the sleeve 13 of the mandrel 10. This effects a rotation of the mandrel 10 and with it the record-engaging members 19, sleeve 23 and flange 24, and by reason of the fact that the flange 24 is continuously in engagement with the disk 37, the latter is rotated on its own axis and is also forced to travel along the cut-away portion of the cam 34, it being repeated that said cam is stationary. As the disk 37 gradually climbs the cut-away portion of the cam, the flange 24 is moved farther and farther toward the right, this movement effecting the compression of spring 32 and also the longitudinal displacement of the record-engaging members 19 in the slots 19' of the mandrel. When the disk 37 occupies the position shown in Fig. 2, that is to say, in engagement with the straight or flat portion 36 of the cam, the record-engaging member has reached the limit of movement toward the right and the spring 32 is under its greatest compression. A slight additional movement brings the parts from the position shown in Fig. 2 to that shown in Fig. 1, the spring 32 acting through pins 29 and flange 24 to return the disk 37 to the cut-away portion of the cam and the record-engaging members to their extreme position to the left. When the parts are in the position indicated in Fig. 2, it is only necessary, in order to remove the record from the mandrel, to introduce the fingers into the end of the record which projects beyond the mandrel.

While, for the sake of illustration, one expression of the inventive idea has been illustrated and described in detail, it is to be understood that the invention is not limited to the construction so illustrated and described, but that many changes may be made without departing from the inventive idea, the limits of the invention being defined in the claims appended hereto.

What is claimed is:—

1. In a talking machine, the combination of a mandrel for supporting a sound record, means for imparting longitudinal movement to the record on the mandrel, and a rotary device for actuating said means.

2. In a talking machine, the combination of a mandrel for supporting a sound record, means engaging the inner end of said record, and rotatable mechanism for effecting longitudinal movement of said engaging means to eject the sound record.

3. In a talking machine, the combination of a mandrel for supporting a sound record, means engaging the inner end of said record, and rotatable mechanism located within the mandrel for effecting longitudinal movement of said engaging means to eject the record.

4. In a talking machine, the combination



of a mandrel for supporting a sound record, a stationary cam, and rotary means cooperating with said cam when the mandrel is rotated backward to shift the record longitudinally of the mandrel.

5 5. In combination, a mandrel for supporting a sound record, a cam and an element associated therewith, one of said parts being movable and the other stationary, means engaging the end of the sound record, and mechanism acting through said cam and element for longitudinally moving said engaging means to eject the sound record.

10 6. In combination, a mandrel for supporting a sound record, a cam and an element associated therewith, one of said parts being movable and the other stationary, means engaging the end of the sound record, and rotary mechanism acting through said cam and element for longitudinally moving said engaging means to eject the sound record.

15 7. In combination, a mandrel for supporting a sound record, a cam and an element associated therewith, one of said parts being movable and the other stationary, means engaging the end of the sound record and moved longitudinally from said cam through its associated element, and means for effecting relative movement between said cam and element.

20 8. In combination, a mandrel for supporting a sound record, a cam and an element associated therewith, one of said parts being movable and the other stationary, means engaging the end of the sound record and moved longitudinally from said cam through its associated element, and rotary means for effecting relative movement between said cam and element.

25 9. In combination, a mandrel for supporting a sound record, a stationary cam, a movable element engaging said cam, ejecting means for the record engaging said movable element, and means acting through said cam and element to move said ejecting means longitudinally.

30 10. In combination, a mandrel for supporting a sound record, a stationary cam mounted within said mandrel, a movable element engaging said cam, longitudinally moving ejecting means for the record engaging said movable element, and rotary means for moving said element to displace said ejecting means.

35 11. In combination, a mandrel for supporting a sound record, a cam and an element engaging said cam, one of said parts being stationary and the other movable, longitudinally movable ejecting means engaging the record and movable part, connections between the mandrel and ejecting means, and means for rotating said mandrel to operate said ejector.

40 12. In combination, a mandrel for supporting a sound record, a cam and an ele-

ment engaging said cam, one of said parts being stationary and the other movable and both being mounted within the mandrel, longitudinally movable ejecting means engaging the record and movable part, connections between the mandrel and ejecting means, and means for rotating said mandrel to operate said ejector through said movable part.

45 13. In combination, a mandrel normally rotating in one direction and supporting a record, ejecting means engaging said record, connections between said ejecting means and mandrel, and means for rotating said mandrel in the opposite direction to shift said ejector longitudinally of the mandrel.

50 14. In combination, a mandrel normally rotating in one direction and supporting a record, ejecting means movable longitudinally of the mandrel engaging said record, connections between said ejecting means and mandrel, and means for rotating said mandrel in the opposite direction to operate said ejector.

55 15. In combination, a mandrel normally rotating in one direction and supporting a record, ejecting means movable longitudinally of the mandrel engaging said record, connections between said ejecting means and mandrel, and manually-operated means for rotating said mandrel in the opposite direction to operate said ejector.

60 16. In combination, a mandrel normally rotating in one direction and supporting a record, ejecting means movable longitudinally of the mandrel engaging said record, connections between said ejecting means and mandrel, manually-operated means for rotating said mandrel in the opposite direction to operate said ejector, and a spring against the tension of which the ejector is operated.

65 17. In combination, a mandrel for supporting a sound record, a stationary cam and an element engaging said cam mounted within said mandrel, a spring-pressed ejector engaging the end of the record and said element, and means for rotating said element to operate said ejector.

70 18. In combination, a mandrel for supporting a sound record, a stationary cam and an element engaging said cam mounted within said mandrel, a spring-pressed longitudinally-moving ejector engaging the end of the record and said element, connections between said ejector and the mandrel, and means for rotating said mandrel to operate the ejector.

75 19. In combination, a mandrel normally rotating in one direction and supporting a sound record, a stationary cam and an element engaging said cam mounted within said mandrel, a spring-pressed longitudinally-moving ejector engaging the end of the record and said element, connections be-



tween said ejector and the mandrel, and means for rotating said mandrel in the opposite direction to operate the ejector.

20. In a talking machine, the combination of a mandrel for supporting a sound record, and rotary means mounted on said mandrel for effecting longitudinal movement of the record when the mandrel is rotated backward.

21. In a talking machine, the combination of a mandrel for supporting a sound record, and rotary means mounted within the mandrel for effecting longitudinal movement of the record when the mandrel is rotated backward.

22. In a talking machine, the combination of a mandrel for supporting a sound record, a cam and an element associated therewith one of said parts being longitudinally movable with relation to the mandrel, means engaging the end of the sound record, and mechanism actuated through said movable part for longitudinally moving said engaging means to shift the record on the mandrel.

23. In a talking machine, the combination of a mandrel rotating in one direction for recording and reproducing, a stationary cam surface, an element engaging said cam and movable thereby longitudinally of the mandrel, a sleeve provided with outwardly projecting members for engaging the sound record on the mandrel, an inwardly projecting flange on said sleeve in operative relation with said cam-engaging element between said element and mandrel, and means for rotating said mandrel backward whereby said sleeve is shifted longitudinally of the mandrel.

24. In a talking machine, the combination of a mandrel for supporting a sound record and normally rotating in one direction to record and reproduce sound, a stationary cam surface, a circular element engaging said cam and mounted within said mandrel, a sleeve provided with outwardly

projecting record-engaging members and an inwardly projecting flange that engages said element, a spring against the tension of which said flange is shifted by said circular element and cam, and means for rotating said mandrel backward whereby said sleeve is moved longitudinally of the mandrel and against the tension of said spring.

25. In a talking machine, the combination of a mandrel for supporting a sound record, means engaging the inner end of the sound record and movable longitudinally of the mandrel, a stationary cam, and means co-operating with said cam to shift said record-engaging means longitudinally of the mandrel when the latter is rotated backward.

26. In a talking machine, the combination of a mandrel for supporting a sound record, means movable longitudinally of the mandrel for shifting the record thereon, and mechanism actuating said shifting means when the mandrel is rotated backward.

27. In a talking machine, the combination of a mandrel for supporting a sound record, record-shifting devices carried by said mandrel and inoperative when the mandrel is rotated forward, and means actuating said devices to eject the record when the mandrel is rotated backward.

28. In a talking machine, the combination of a mandrel for supporting a sound record, means for shifting the record longitudinally of the mandrel to eject it, and cam mechanism inoperative when the mandrel is rotated forward but actuating said shifting mechanism when the mandrel is rotated backward.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

J. S. GRIFFITH,  
L. S. EASTMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



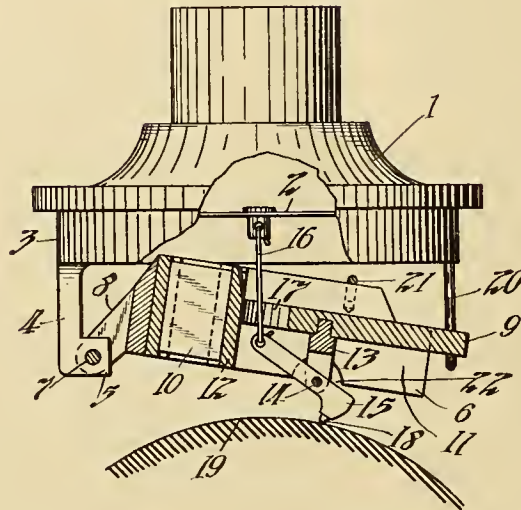


A. N. PIERMAN.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED MAR. 23, 1912.

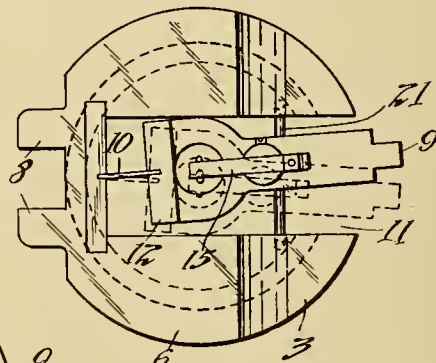
1,119,113.

Patented Dec. 1, 1914.

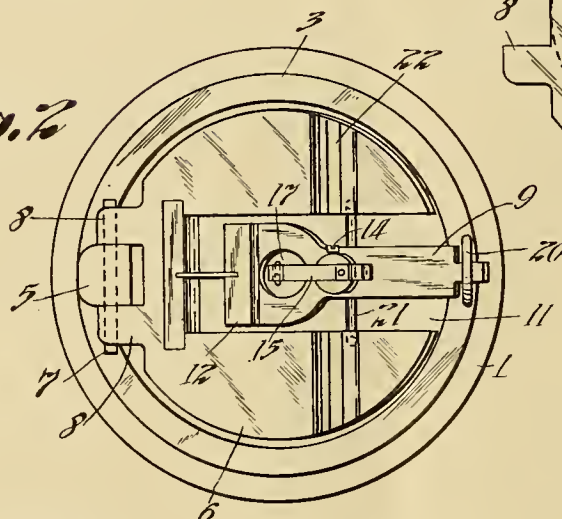
*Fig. 1*



*Fig. 3*



*Fig. 2*



*Witnesses:*  
*W. A. Hardy.*

*Inventor:*  
 Alexander N. Pierman  
 by Frank L. Rye  
 his Atty.

# UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-REPRODUCER.

1,119,113.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed March 23, 1912. Serial No. 685,836.

*To all whom it may concern:*

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a full, clear, and concise description.

The present invention relates to phonograph reproducers and has for its object the provision of an improved mounting for the stylus lever, wherein all looseness in the connections of parts is obviated, which renders the reproducer capable of withstanding jarring without causing the stylus to skip from one thread of a record to another and thus insures the exact tracking and reproduction of a record.

It is customary in reproducers, as now constructed, to pivotally mount the floating weight on the sound box, to provide a member, pivotally connected to the weight for carrying the stylus lever, and to provide separate means, such as a spring, for normally holding the member in central position while allowing lateral movements thereof. This construction is objectionable owing to the impossibility of making a sufficiently tight fit in the pivotal connection of the floating weight and member, the looseness existing therein, and which increases with use, frequently resulting in the jumping or skipping of the stylus from one thread of a record to another when the reproducer is jarred, giving a faulty reproduction and producing foreign and objectionable sounds.

In overcoming the objections indicated, I preferably construct my reproducer as follows: A floating weight is pivotally mounted on a reproducer sound box of usual construction, a member of small inertia compared with that of the weight is employed for carrying the stylus lever, which is connected to the diaphragm mounted in the sound box in any suitable manner, and the member is mounted on the weight by means of a resilient member rigidly connected at its ends to the weight and member respectively. This resilient connection between the weight and member may be of any suitable construction, but as shown is a very thin flat sensitive spring of any suitable material, such as spring steel, which normally maintains the member carrying the stylus lever in central

position while allowing lateral movement of the member with respect to the weight so as to permit the stylus to faithfully follow all irregularities in the record threads. In a reproducer constructed in accordance with my invention, the stylus will not skip from one thread to another when the reproducer is jarred, for all looseness in the connection between the floating weight and member carrying the stylus lever is obviated.

Other objects of my invention reside in the features hereinafter described and claimed.

In order that my invention may be more clearly understood, reference is made to the accompanying drawing forming a part of the specification in which the same reference characters are used to designate corresponding parts throughout and in which:

Figure 1 is an elevation partly broken away, and partly in section, showing a reproducer constructed in accordance with my invention; Fig. 2 is a bottom view of Fig. 1; and Fig. 3 is a view similar to Fig. 2, showing different positions of the member carrying the stylus lever, the sound box body being omitted.

The sound box body 1 is provided with a suitable diaphragm 2, held in position in any suitable manner, and with an annular rim or flange 3. Flange 3 is provided with a depending member 4, which may be of any suitable form, but is here shown as a bracket integral with flange 3, and having a laterally extending lug 5. Floating weight 6 is connected to member 4 in any suitable manner, but preferably by means of a pivot pin or stud 7 carried by a pair of lugs 8, 8 on the weight, the pin being mounted in lug 5, and lugs 8, 8, which closely engage the sides of lug 5 to prevent lateral movement of the weight with respect to the sound box. This preferable manner of mounting the weight confines its movement to a direction substantially at right angles to the plane of diaphragm 2. A member 9 of small inertia compared with floating weight 6, is connected to said weight by any suitable resilient means, as for example, by a very thin, flat and sensitive spring 10 of any suitable material, such as spring steel, rigidly connected at its ends to floating weight 6 and member 9 respectively. Part 9 is shown as an elongated member which is preferably mounted in a position substantially parallel with float-



ing weight 6 and within said weight by providing a central recess 11 in said weight of sufficient width to allow considerable lateral movement of the member therein, as shown by full and dotted lines in Fig. 3. Resilient member 10 is shown as arranged in a vertical position with one of its ends securely fixed to weight 6, at the center of the wall closing the end of recess 11, while the other end of member 10 is fixed to the flat end 12 of member 9 at its vertical center line. The resilient member 10 normally maintains member 9 in a central position with respect to the floating weight 6 and when member 9 is in normal position the longitudinal axes of members 6 and 9 are in substantially the same plane.

Mounted on member 9 in any suitable way as by a yoke 13 fastened to the under side of said member and pivot pin 14 is a stylus lever 15 connected to diaphragm 2 in any suitable manner, as by link 16 passing through an aperture 17 provided in said member 9. Stylus lever 15 carries the usual stylus 18 adapted to track the threads of the record, a portion of which is shown at 19 in Fig. 1. Lateral movement of member 9 with respect to the diaphragm, and in the example shown also with respect to the floating weight, is confined within limits, by reason of the free end of said member being received in a stirrup 20 depending from the sound box body 1. Member 21 is a brace connecting the separated end portions of weight 6, formed by recess or slot 11. Weight 6 is provided with the usual groove 22 in order that the mounting of stylus lever 15 on member 9 may be readily accessible. According to the preferred form of my invention, all movements of the stylus resulting from large surface irregularities are provided for by the pivotal connection of the weight to the sound box body, while all lateral movement of the stylus with respect to the sound box body are taken care of by the mounting for the stylus lever forming the special feature of my invention. Resilient member 10 is free from stress only when member 9 is in its central position. A force acting to move member 9 to either side of its central position places member 10 under a slight stress to gently return the member 9 to its central position, when the force ceases to so act.

It is to be understood that I am in no way limited to the particular form of my invention illustrated and described but only by the spirit thereof as disclosed in the specification and claims.

Having thus fully described my invention and the preferred form of carrying the same into effect, what I claim and desire to protect by Letters Patent of the United States is as follows:

1. A phonograph reproducer comprising

a floating weight, a stylus lever, a member provided with a fulcrum for said lever about which fulcrum the lever is arranged to oscillate in accordance with the vibrations imparted to the stylus by the undulations of a sound record groove, and resilient means for supporting said member from the floating weight, for normally holding said member in a position in line with that portion of the record groove in engagement with the stylus and adapted to return it to such position after the cessation of any force tending to move it therefrom, substantially as described.

2. In a phonograph reproducer, the combination with the sound box body and diaphragm mounted therein, of a floating weight pivoted to said body and movable in a direction intersecting the plane of the diaphragm, a stylus lever connected to the diaphragm, a member provided with a fulcrum for said lever about which fulcrum the lever is arranged to oscillate in accordance with the vibrations imparted to the stylus by the undulations of the sound record groove and a spring fixed at one end to said floating weight and supporting said member from its free end, said spring normally holding said member in a position in line with that portion of the record groove in engagement with the stylus and adapted to return it to such position after the cessation of any force tending to move it therefrom, substantially as described.

3. In a phonograph reproducer, the combination with the sound box body and diaphragm mounted therein, of a floating weight pivoted to said body, a stylus lever connected with the diaphragm, an elongated member of small inertia compared with the weight and provided with a pivot for said lever, said lever being arranged to oscillate about said pivot in accordance with the vibrations imparted to the stylus by the undulations of the sound record groove and a spring secured at one end to said weight and supporting said member from its other end, said spring normally holding said member in a predetermined position with respect to said weight and being under stress when said member is moved from said predetermined position, substantially as described.

4. In a phonograph reproducer, the combination with the sound box body and diaphragm mounted therein, of a floating weight pivoted to said body, an elongated member of small inertia compared with the weight and carrying a stylus lever which is connected with the diaphragm, and a spring secured at one end to said weight and supporting said member from its other end, said spring normally holding said member in a predetermined position with respect to said weight and being under stress when



said member is moved from said predetermined position, the longitudinal axes of the weight and member being substantially in the same plane when the member is in its  
5 normal position, substantially as described.

5. A phonograph reproducer comprising a floating weight, a stylus lever, a member provided with a fulcrum for said lever about which fulcrum the lever is arranged to oscillate in accordance with the vibrations imparted to the stylus by the undulations of a sound record groove, and resilient means for supporting said member from the float-

ing weight, said means being adapted to normally maintain the member in a predetermined position with respect to the floating weight and being placed under stress when said member is moved from said predetermined position, substantially as described. 15

This specification signed and witnessed this 21st day of March, 1912. 20

ALEXANDER N. PIERMAN.

Witnesses:

WILLIAM A. HARDY,

ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





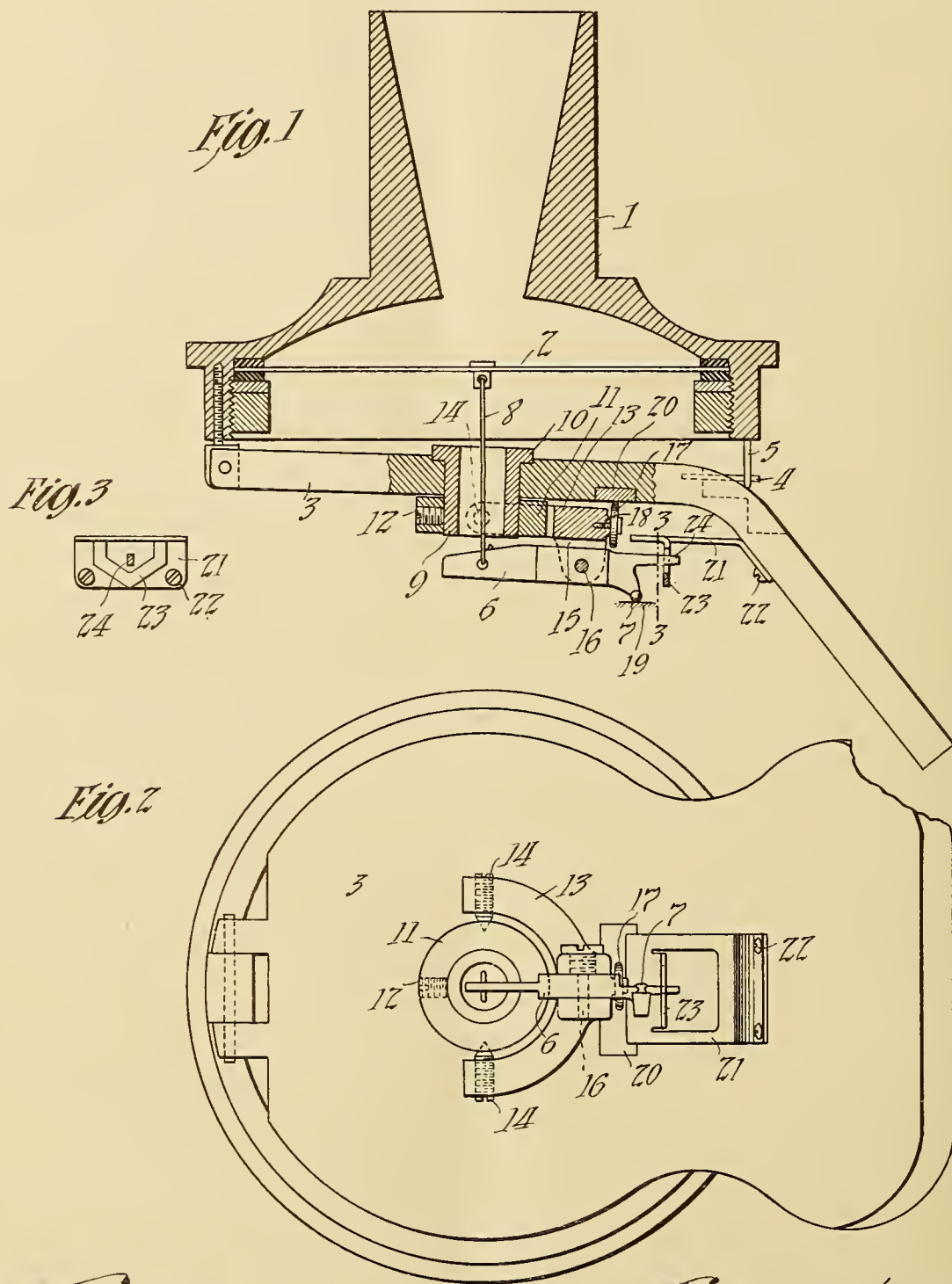


T. A. EDISON.  
SOUND REPRODUCER.  
APPLICATION FILED NOV. 14, 1910.

1,119,141.

Patented Dec. 1, 1914.

2 SHEETS—SHEET 1.



*Witnesses:*  
Frank D. Lewis  
Dyer Smith

*Inventor:*  
Thomas A. Edison  
by Frank D. Lewis  
his Atty.



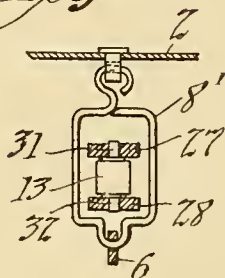
T. A. EDISON.  
SOUND REPRODUCER.  
APPLICATION FILED NOV. 14, 1910.

1,119,141.

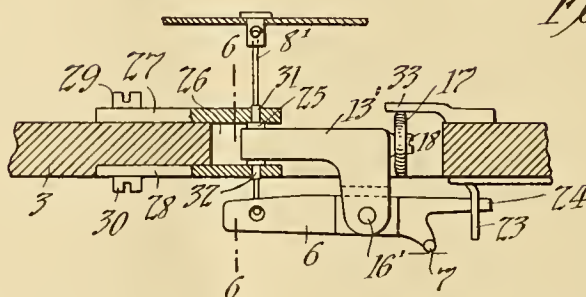
Patented Dec. 1, 1914.

2 SHEETS-SHEET 2

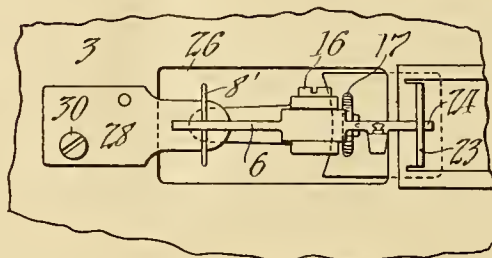
*Fig. 6*



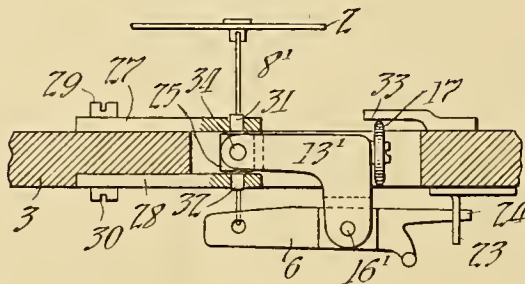
*Fig. 4*



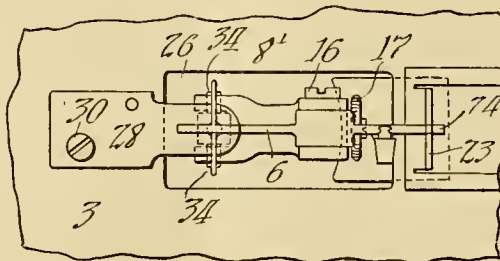
*Fig. 5*



*Fig. 7*



*Fig. 8*



*Witnesses:*  
Frank Lewis  
Dyer Smith

*Inventor:*  
Thomas A. Edison  
by Frank L. Lewis  
his Atty.



# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-REPRODUCER.

1,119,141.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed November 14, 1910. Serial No. 592,226.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a description.

My invention relates to sound reproducers, and my object is to provide a reproducer in which the stylus lever is so mounted that the stylus will always track the record faithfully under all circumstances. The stylus lever is so mounted as to be moved with the greatest freedom in conformity with the engagement of the stylus in the record groove. The stylus lever and its mounting are of small mass or inertia and are movable laterally with respect to the floating weight supporting the same, the stylus lever also preferably being bodily movable with respect to the weight in a plane at right angles to the plane of the latter. The provision of means permitting lateral movement of the stylus with respect to the floating weight is intended to permit the stylus to track the record groove without having to overcome the inertia of the floating weight when a lateral movement is necessary, and the provision of means permitting the stylus lever to move bodily toward and away from the floating weight prevents binding of the mounting in the weight and increases the sensitiveness and efficiency of the device.

Another object of my invention is the provision of a roller upon the stylus lever mounting, this roller contacting the under side or other surface of the floating weight during the lateral movements of the lever with respect to the weight, whereby friction is reduced.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents in side elevation and in vertical cross section a reproducer embodying one form of my invention. Fig. 2 is a bottom plan view of the same. Fig. 3 is a cross section on line 3—3 of Fig. 1

looking to the right. Fig. 4 is a partial side elevation and vertical cross section through a modified form of my device. Fig. 5 is a bottom plan view of the same. Fig. 6 is a cross section taken on line 6—6 in Fig. 4, and Figs. 7 and 8 are views similar to Figs. 4 and 5 of another modified form of my device.

Referring to the drawings, the reproducer sound box 1 is provided with the diaphragm 2 and with the floating weight 3 pivotally secured to the sound box 1 in the usual manner. The mounting of floating weight 3 may permit slight lateral movement of the weight with respect to the sound box, if desired, as well as an up and down oscillation of the weight, movement of the weight being limited by the engagement of pin 4 carried by the weight within stirrup 5 carried by the sound box. Stylus lever 6 carries stylus 7 and is connected to diaphragm 2 by link 8.

The stylus lever is preferably mounted in the following manner:—A hollow stud or sleeve 9 is rotatably mounted in floating weight 3, being free to rotate about an axis extending through link 8 at right angles to the median plane of floating weight 3 or substantially at right angles to the plane of diaphragm 2. This sleeve may be flanged as shown at 10 to form a bearing surface engaging the upper surface of the floating weight, or within a countersunk depression on the upper side of the weight as shown. The link 8 connecting the stylus lever to the diaphragm extends substantially axially through the interior of sleeve 9. A collar 11 is secured upon the lower end of sleeve 9 below floating weight 3 by any suitable means, as the screw 12; and a yoke 13 is pivotally connected to collar 11 by screw centers 14 engaging within conical cavities at opposite points upon the periphery of collar 11, the centers 14 having a common axis passing through link 8. Yoke 13 is provided with a depending lug 15 at a point therein most distant from the centers 14. The horizontal pin 16 upon which stylus lever 6 is pivotally supported is carried by lug 15 of member 13. Also, preferably, a roller or wheel 17 is secured to the end of yoke 13 beyond lug 15, being mounted upon stud 18 in yoke 13 and free to rotate upon the said stud. When stylus 7 is in engagement with the record illus-



trated diagrammatically in Fig. 1 at 19, the roller 17 will engage the under side of floating weight 3 and support the latter. A hardened bearing surface or runway 20 is preferably provided upon the under side of the floating weight for the engagement of roller 17 therewith.

For centering the stylus lever with respect to the record groove, I preferably provide a bracket 21 secured to the floating weight as by screws 22 and having a downwardly extending V-shaped stirrup 23 within which extends a nose or projection 24 formed on the forward end of stylus lever 6. When the floating weight is lifted to disengage the stylus from the record, yoke 13 swings about its pivots 14 by gravity and stylus 7 is centered by the coaction of nose 24 of the lever with the V-shaped stirrup 23.

It is to be understood that in the structure described the stylus lever is not only pivotally movable about pin 16 as the stylus 7 tracks the vertically undulating bottom of the sound groove, but that also the stylus lever as a whole is movable universally with respect to the floating weight, and that because of the pivotal connection of member 13 with member 9, up and down movement of the member 13 is permitted without causing a tendency of the member 9 to bind in the floating weight 3 and said member is accordingly permitted to oscillate in said weight without binding. The moving parts constituting the mounting of the stylus lever are of little mass; and consequently the inertia necessary to be overcome in moving the same is slight. The member 9 or equivalent thereof rotatably mounted in the floating weight need not necessarily be placed in the position shown in line with the center of diaphragm 2, although I consider this position the most desirable. The engagement of roller 17 with the under side of the floating weight greatly reduces friction during the lateral movement of the stylus with respect to the floating weight. The upper side of collar 11 may frictionally engage the under side of the floating weight during lateral movement of the stylus in operation.

In Figs. 4 and 5 I have shown a modified form of my device, in which stylus lever 6 is pivotally mounted upon pin 16' carried by member 13' which is mounted to oscillate laterally with respect to floating weight 3 by being secured to pin 25 positioned at right angles to the median plane of floating weight 3 within an opening 26 in said weight through which opening the member 13' also extends. Plates 27 and 28 are secured upon the upper and lower sides of floating weight 3 respectively as by screws 29 and 30. These plates extend somewhat across opening 26 in the floating weight, and afford a bearing for the reduced portions 31, 32 of pin 25, the

pin 25 and member 13' thus being adapted to oscillate laterally with respect to the floating weight during the tracking of stylus 7 within the record groove. Pin 25 is preferably located in line with the center of diaphragm 2, as shown. Roller 17 is rotatably mounted upon stud 18 on the end of member 13' in the same manner as described in connection with Fig. 1, this roller being adapted to contact and frictionally bear against the under surface of a bracket 33 extending from the upper side of floating weight 3 part way across opening 26 in the floating weight. In this form of my device, the link 8' joining diaphragm 2 to the tail of lever 6 is formed as shown in Fig. 6, to pass through opening 26 in the floating weight and extend around plates 27 and 28 and member 13' therein, the link preferably passing around the said members on both sides in an approximately rectangular form, as shown. In this construction, the stylus lever is not movable bodily toward and from the floating weight, as in the form of my device first described, but is laterally movable with respect to the weight. This construction provides only rolling friction for the member 13' between the roller 17 and the bracket 33 in addition to the slight turning friction of the journals 31, 32 in their bearings in plates 27 and 28.

In Figs. 7 and 8 I have illustrated another construction in which stylus lever 6 is movable bodily up and down with respect to the floating weight, as well as laterally with respect to the same, as in the case of the structure illustrated in Figs. 1 and 2. In this form of my device, lever 6 is pivoted on stud 16' carried by a depending lug of member 13', which is pivoted upon laterally extending reduced portions or journals 34, 34 of pin 25 having reduced portions or journals 31 and 32 rotatably mounted in plates 27 and 28 secured upon the upper and lower surfaces of floating weight 3 as described in connection with Figs. 4 and 5. Thus, in this structure member 13' may oscillate in a plane at right angles to diaphragm 2 about pivot pin 34, and also in a plane at right angles thereto about the axis of journals 31 and 32 supported in plates 27 and 28. In this construction, the roller 17 bears against the under surface of bracket 33, as in the construction illustrated in Figs. 4 and 5. A V-shaped stirrup 23 carried by floating weight 3 coöperates with nose 24 of lever 6 to center the stylus lever, in the structures illustrated in Figs. 4, 5, 6 and 8, in the same manner as described in connection with Figs. 1 and 2. The link 8' in the construction illustrated in Figs. 7 and 8 is of the same form as described in connection with Figs. 4 and 5. It should be understood that my invention is not limited to the exact construction and details described, but may be



modified within the scope of my invention as claimed in the appended claims.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:—

1. In a sound reproducer, the combination with vibratory means, of a stylus lever connected thereto, a stylus carried by said lever, a pivoted floating weight, a member supported by said weight and free to rotate about an axis at an angle thereto, and a member pivoted to said first named member and provided with means forming a support for said weight when said stylus is in engagement with a record, said lever being carried by said second named member, substantially as described.

2. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, and a member pivotally supporting said lever, said member being supported by said weight, being universally movable with respect thereto and being provided with means forming a support for said weight when said stylus is in engagement with a record, substantially as described.

3. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, a member supported by said weight free to rotate about an axis substantially at right angles thereto, and a member pivoted to said first member said second member being free to oscillate about an axis at an angle to said first axis and being provided with means forming a support for said weight when said stylus is in engagement with a record, said lever being carried by said second member, substantially as described.

4. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, a member supported by said weight free to rotate about an axis substantially at right angles thereto, and a member pivoted to said first member, said second member being free to oscillate about an axis at an angle to said first axis and being provided with means forming a support for said weight when said stylus is in engagement with a record, and a support upon which said lever is pivotally mounted carried by said second member, substantially as described.

5. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, and means to which said lever is pivoted, supported from said weight and arranged to permit universal movement of the fulcrum of said lever with respect to said weight, said last named

means comprising a member forming a support for said weight when said stylus is in engagement with a record, substantially as described.

6. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, a member supported by said weight, free to move laterally and also up and down with respect thereto and arranged to bear upon said weight in its lateral movement with rolling friction, and a pivotal support for said lever carried by said member, substantially as described.

7. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, a member supported by said weight and free to move laterally and also up and down with respect thereto, a roller carried by said member adapted to frictionally bear upon said weight, and a pivotal support for said lever carried by said member, substantially as described.

8. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, a member supported by said weight free to rotate about an axis substantially at right angles thereto, and a member pivoted to said first member free to oscillate about an axis at an angle to said first axis, means carried by said second member adapted to contact said weight to form a support therefor when said stylus is in engagement with a record, and a pivotal support for said lever carried by said second member, substantially as described.

9. In a sound reproducer, the combination with vibratory means of a stylus lever connected thereto and stylus carried thereby, a pivoted floating weight, a member supported by said weight free to rotate about an axis substantially at right angles thereto, and a member pivoted to said first member free to oscillate about an axis at an angle to said first axis, a roller carried by said second member adapted to contact said weight when said stylus is in engagement with a record and to roll upon the surface of the same when said first member moves about its axis, and a pivotal support for said lever carried by said second member, substantially as described.

10. In a sound reproducer, the combination of vibratory means, a stylus lever, a stylus carried by said lever, connecting means between said lever and said vibratory means, a pivoted floating weight, a member supported by said weight and free to rotate about an axis passing through said connecting means, and a member pivoted to said first named member and free to oscillate about an axis extending at an angle to said first named axis and passing through said



connecting means, means carried by said second member adapted to contact said weight to form a support therefor when the stylus is in engagement with the record, and a pivotal support for said lever carried by said second member, substantially as described.

11. In a sound reproducer, the combination of vibratory means, a stylus lever, a stylus carried by the forward end of said lever, connecting means between said lever and said vibratory means, means pivotally supporting said lever intermediate said stylus and said connecting means, said sup-

porting means being free to move laterally about an axis passing through said connecting means, and means coacting with the forward end of said lever for centering the same, whereby the effective position of said centering means is remote from said axis, substantially as described.

This specification signed and witnessed this 9th day of November, 1910.

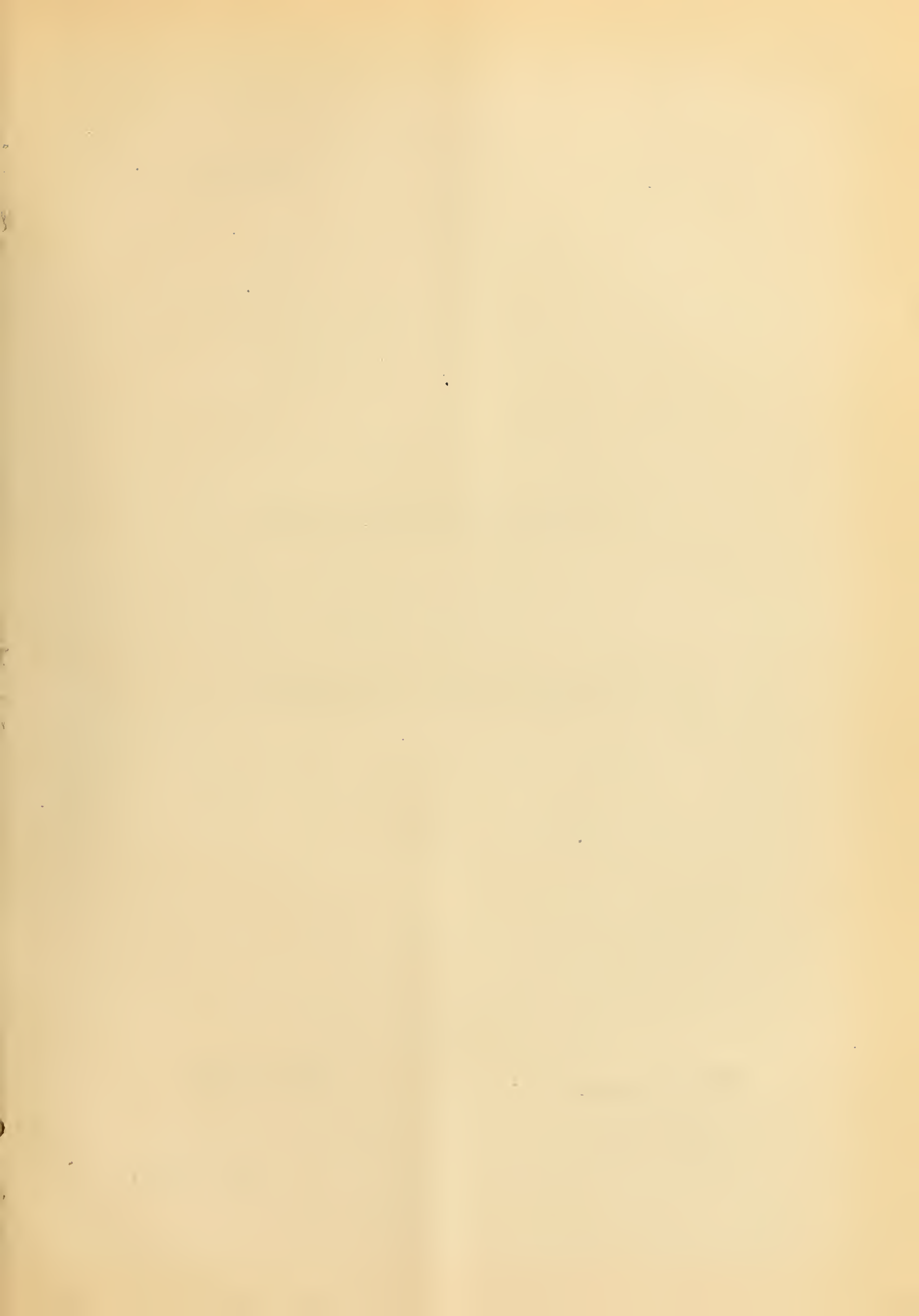
THOS. A. EDISON.

Witnesses:

DYER SMITH,

ANNA R. KLEHM.

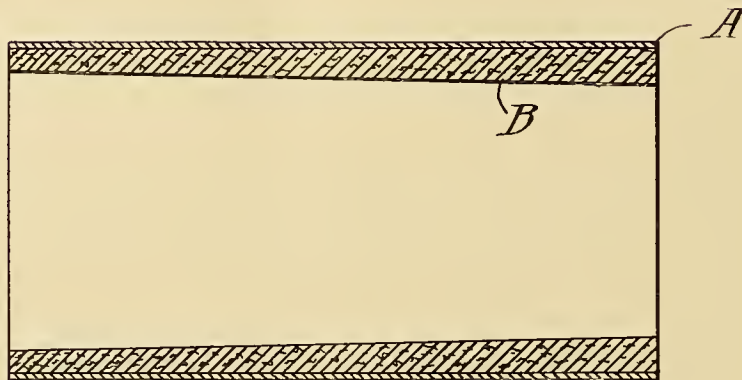
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



T. A. EDISON.  
SOUND RECORD.  
APPLICATION FILED APR. 5, 1911.

1,119,142.

Patented Dec. 1, 1914.



*Witnesses:*  
Frank D. Lewis  
Frederick Bachmann.

*Inventor:*  
Thomas A. Edison  
by Frank L. Rice  
his Atty.



# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-RECORD.

1,119,142.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed April 5, 1911. Serial No. 619,011.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Records, of which the following is a description.

My invention relates to an improved sound record preferably of that type which consists of a base or backing of one material, usually a molded material, and an outer surface or covering of another material which receives the sound record.

The main object of my invention is to produce a record which can be cheaply and readily produced, which will be strong and durable, have very little surface noise on reproduction, the record itself permitting a large number of reproductions without sensible wear, and which will be effective in every way for the purpose of recording and reproducing sounds.

Another object of my invention is to construct the parts of the record—that is to say the base or backing and the outer covering of sound recording material—of substances which have the same or practically the same coefficient of expansion under changes of temperature, whereby both parts of the phonogram blank are made to expand and contract equally and the cracking of the outer surface material does not occur.

Other objects of my invention will appear more fully in the following specification and appended claims.

I prefer to employ for the outer record surface, a thin coating or layer of a hard substance solid at ordinary temperatures and preferably composed of a resinous body, like shellac, with which is combined a substance such as tetra-chloronaphthalene, dinitrobenzol or naphthalene which when melted will take up or become emulsified with the shellac but which will crystallize out from the shellac on cooling. While various substances can be combined with shellac to produce my preferred surface composition, I find that the most satisfactory results are obtained with tetra-chloronaphthalene; and, therefore, prefer to use the same. In practice, the tetra-chloronaphthalene is melted and the shellac in powdered form is gradually added, while the melted liquid is being agitated by a stirrer. Or a powder

containing the tetra-chloronaphthalene and shellac in proper proportion may be gradually added to a liquid of the same composition which is being agitated. The tetra-chloronaphthalene should be in approximately the proportion of one-fourth of the shellac by weight, although a less proportion of the tetra-chloronaphthalene may be used. When the substance cools and solidifies, the tetra-chloronaphthalene separates out and will be found distributed through the mass in a fibrous crystalline form, the crystals being felted or united together, the shellac regaining its original hardness. This composition is more particularly set forth in United States Patent No. 1,002,505, dated Sept. 5th, 1911. In forming the sound record, the liquid composition should be constantly agitated to prevent the segregation of the tetra-chloronaphthalene and may be flowed or otherwise located upon the base of the record and there allowed to harden.

A composition such as described above retains all the hardness of shellac, but has a greater toughness and elasticity than shellac and other qualities desirable in a composition for the formation of sound records. The toughness is largely due to the felted structure of crystals of tetra-chloronaphthalene in the shellac. It may be remarked that tetra-chloronaphthalene has perhaps the most powerful tendency of any organic substance to crystallize from amorphous materials.

The term "tetra-chloronaphthalene" is a trade designation for a product formed by the chlorination of naphthalene, which crystallizes as a felt of flexible, fibrous material. It apparently is a mixture of various chlorine substitution products of naphthalene probably the tri-, tetra-, and penta-chloronaphthalenes, having substantially the same average composition as tetra-chloronaphthalene.

As a suitable material for the base of my improved record, I prefer to use montan wax impregnated with about 7% of cotton flock. The above named wax is a substance of dark yellowish color somewhat resembling discolored carnauba wax and is obtained, as I am informed and believe, from certain kinds of bituminous brown coal by a certain process of extraction or solution. The so-called "montan wax" is imported into the United States from Germany and is



a mineral wax obtained from certain kinds of bituminous brown coal by extraction with suitable solvents. Chemically, it consists of a mixture of hydro-carbon acids combined  
5 with fatty alcohols together with some free fatty acids and hydrocarbons. By the use of cotton flock or other fibrous material with the montan wax, I secure a high degree of durability for the base, the fibrous material  
10 being completely penetrated and inclosed by the wax-like material, and at the same time controlling in a degree the expansion and contraction of the base. If desired, inert powders may be mixed with the montan  
15 wax and flock to further control the expansion and contraction.

I have found that the specific compositions for the base with flock and for the surface material mentioned above have substantially the same coefficient of expansion so  
20 that there is no danger of the record becoming cracked under changes of temperature. I have also found that my improved record is so durable that it may be dropped or even  
25 thrown upon the floor with considerable force without encountering any objectionable injury. While, however, I prefer to use the specific composition mentioned, my invention is not limited thereto; and I wish  
30 it to be understood that my invention comprises all the modifications falling within the scope of the appended claims.

In order that my invention may be better understood, attention is directed to the accompanying drawing forming part of this  
35 specification and in which I illustrate a central longitudinal section of a cylindrical sound record constructed according to my invention.

40 In the drawing A represents the outer recording layer or surface formed of a hard tough composition such as the shellac and tetra-chloronaphthalene mentioned above, and B the base of cheaper material such as

montan wax and cotton flock, and if desirable inert powders, such as chalk. While I have shown a cylindrical record, my invention is evidently applicable to disk records as well.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A sound record comprising a surface portion of a resinous material having crystallized fibers distributed through the same,  
55 and a base of montan wax impregnated with fibrous material in such amount as to give the base substantially the same coefficient of expansion as said surface portion, substantially as described. 60

2. A sound record comprising a surface portion of shellac and a halogenized naphthalene crystallizing as fibers distributed through the shellac, and a base of montan wax impregnated with fibrous material in  
65 such amount as to give the base substantially the same coefficient of expansion as said surface portion, substantially as described.

3. A sound record comprising a surface portion of shellac and a halogenized naphthalene crystallizing as fibers distributed through the shellac, and a base of hard wax-like material impregnated with approximately 7% of fibrous material, substantially  
70 as described. 75

4. A sound record comprising a surface portion of shellac and a halogenized naphthalene crystallizing as fibers distributed through the shellac, and a base of montan wax impregnated with approximately 7%  
80 of fibrous material, substantially as described.

This specification signed and witnessed this 3rd day of April 1911.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





C. L. HIBBARD.

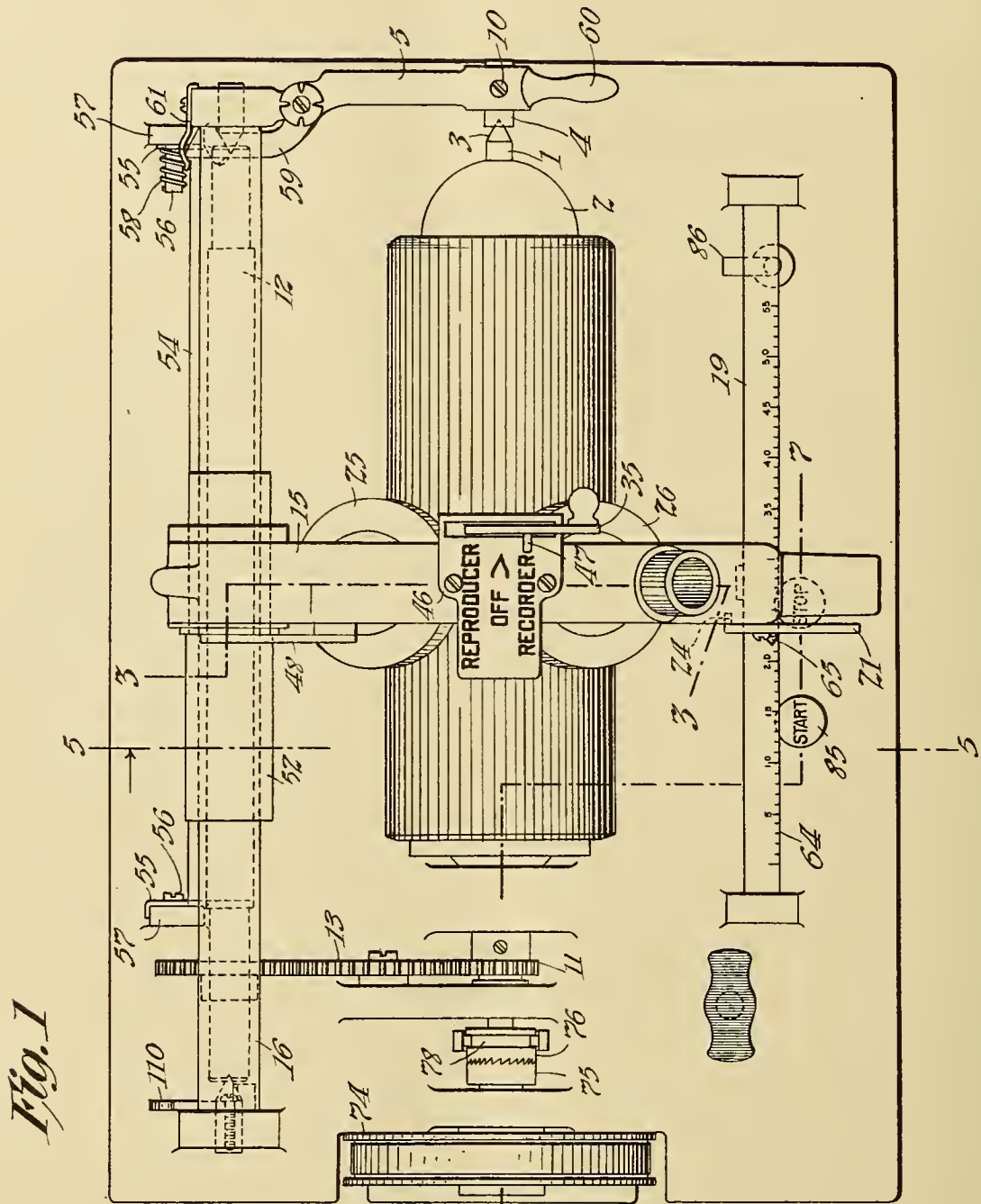
PHONOGRAPH.

APPLICATION FILED NOV. 22, 1907.

1,119,157.

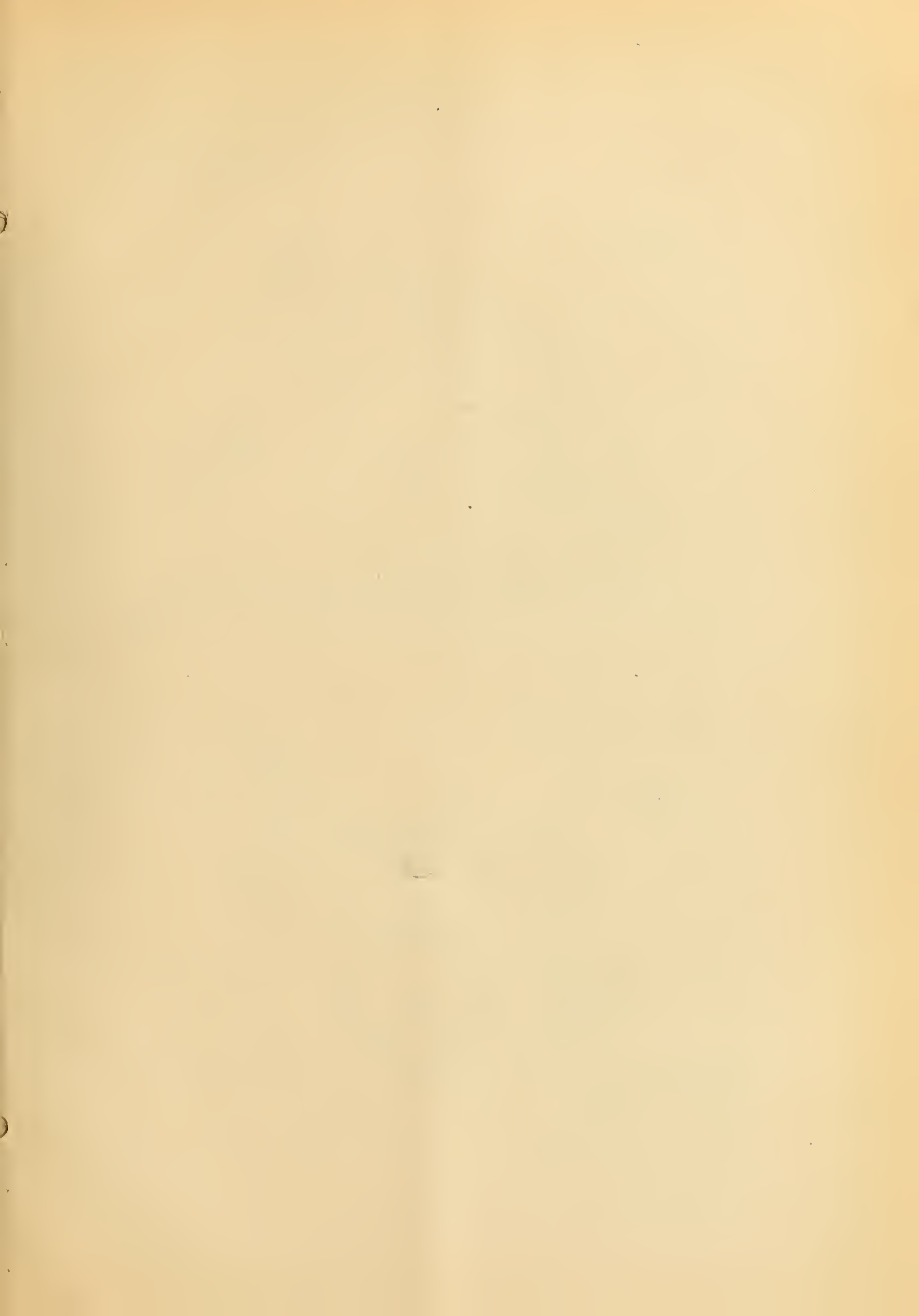
Patented Dec. 1, 1914.

5 SHEETS—SHEET 1.



*Witnesses:*  
*Frank D. Lewis*  
*Delos Holden*

*Inventor:*  
*Charles L. Hibbard*  
*by Frank L. Byer*  
*Atty.*

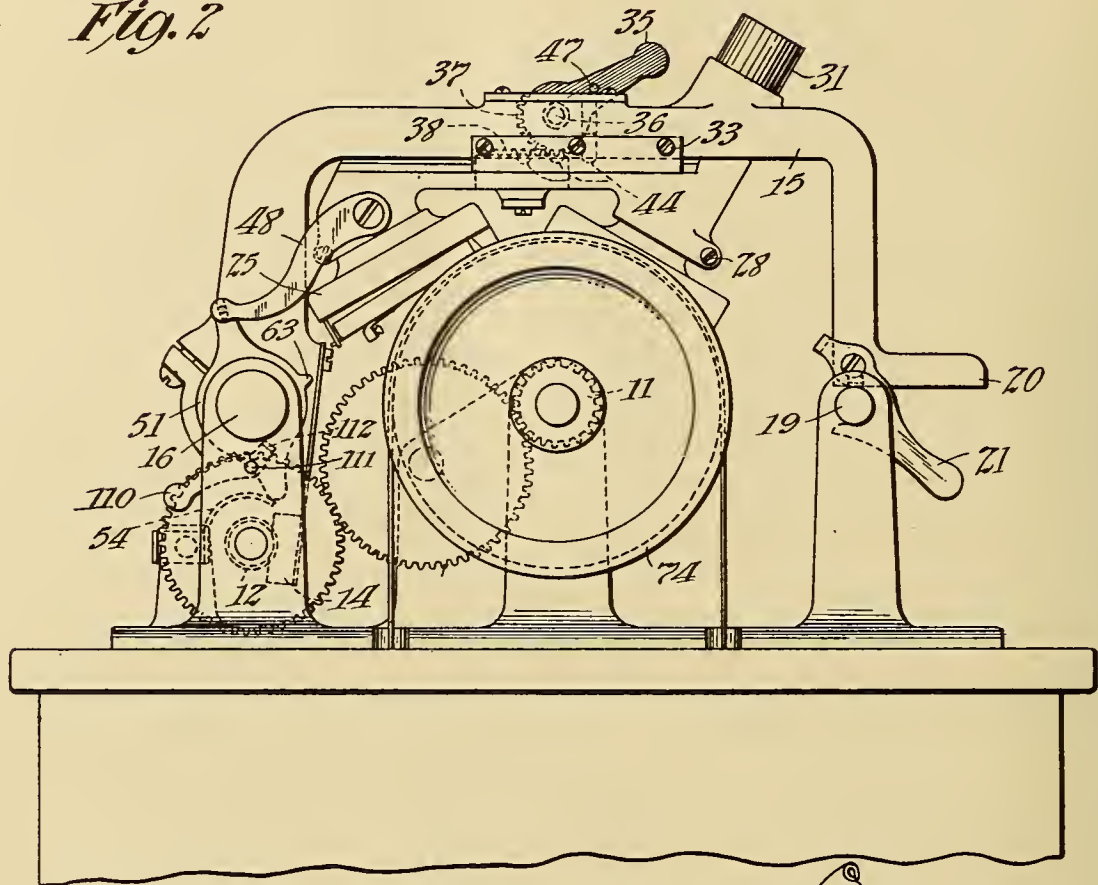


1,119,157.

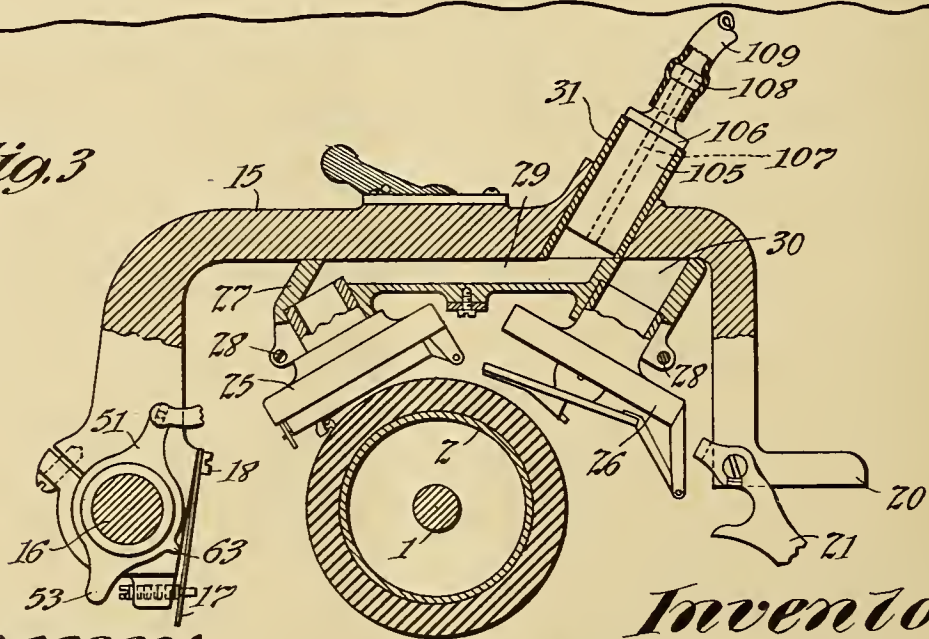
Patented Dec. 1, 1914.

6 SHEETS—SHEET 2.

*Fig. 2*



*Fig. 3*



*Witnesses:*  
 Frank D. Lewis  
 Delos Holden

*Inventor:*  
 Charles L. Hibbard  
 by Frank L. Owen  
 Atty.





C. L. HIBBARD.

PHONOGRAPH.

APPLICATION FILED NOV. 22, 1907.

1,119,157.

Patented Dec. 1, 1914.

5 SHEETS—SHEET 3.

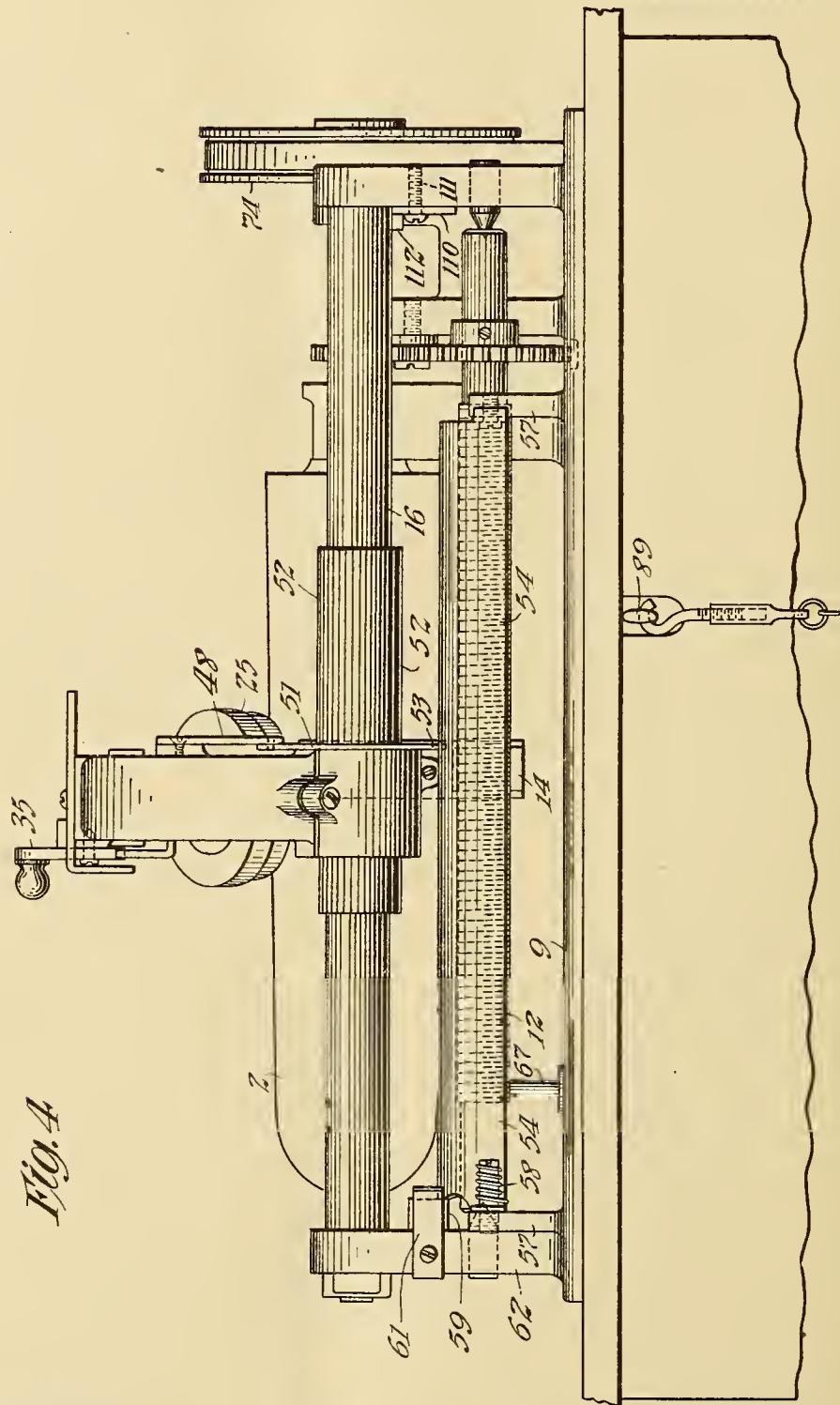


Fig. 4

*Witnesses:*

*Frank D. Lewis*

*Delos Holden*

*Inventor:*

*Charles L. Hibbard*

*by Frank L. Dyer*

*Atty.*



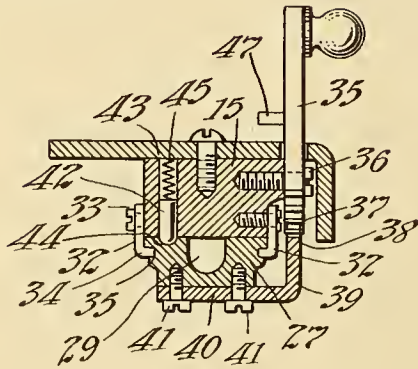


1,119,157.

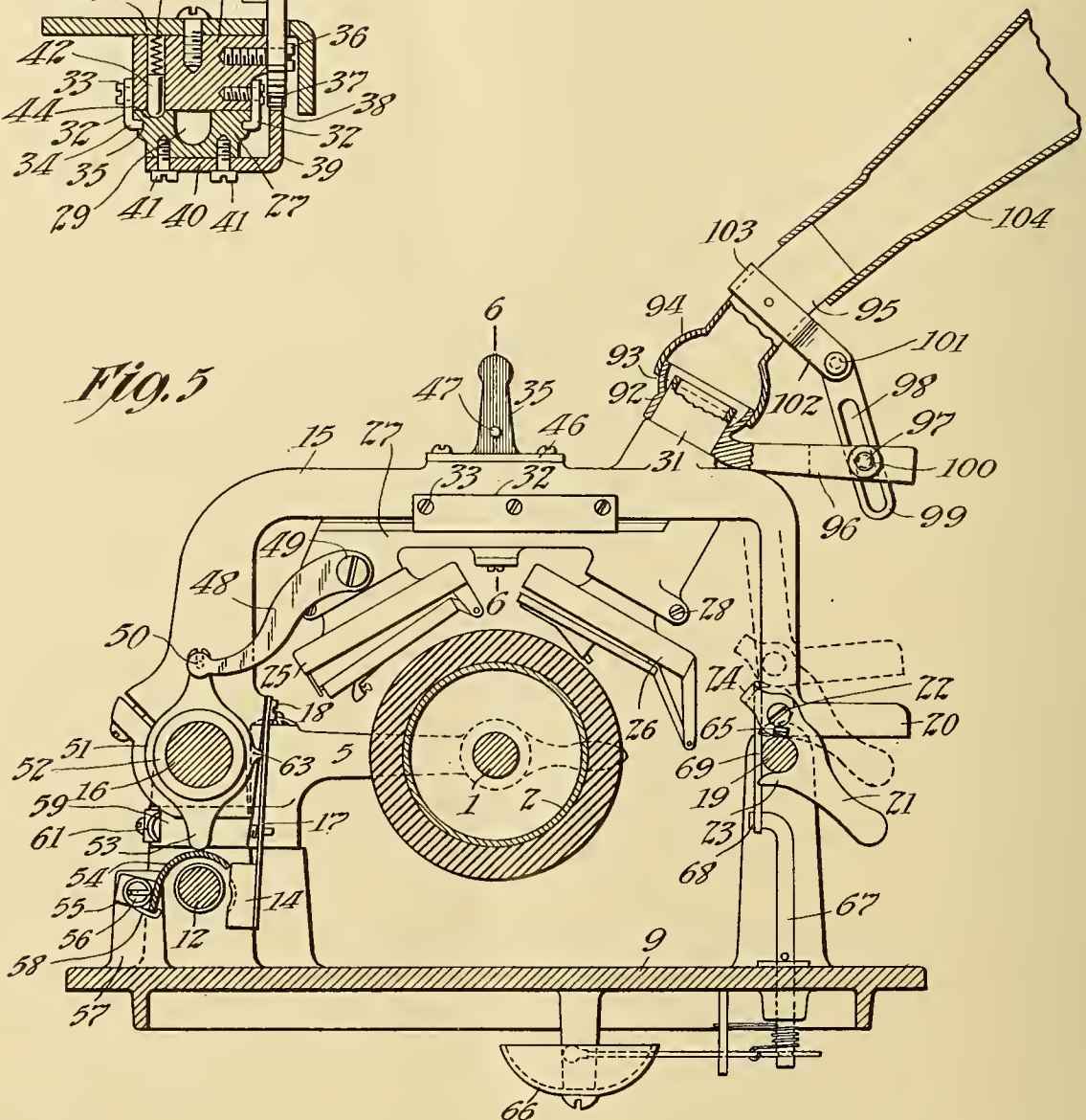
Patented Dec. 1, 1914.

5 SHEETS—SHEET 4.

*Fig. 6*



*Fig. 5*



*Witnesses:*  
 Frank D. Lewis  
 Delos Holden

*Inventor:*  
 Charles L. Hibbard  
 by Frank L. Lewis  
 Atty.



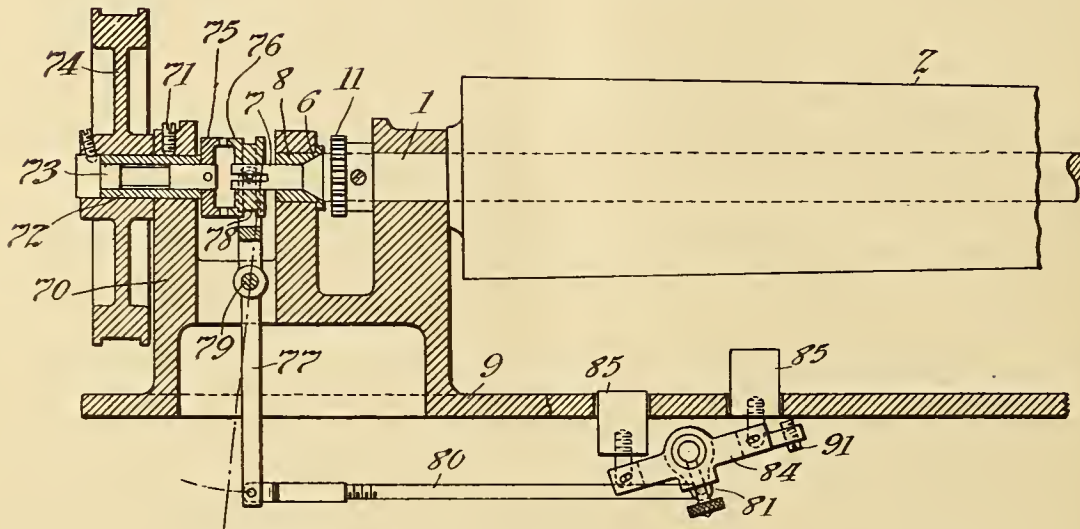
C. L. HIBBARD.  
 PHONOGRAPH.  
 APPLICATION FILED NOV. 22, 1907.

1,119,157.

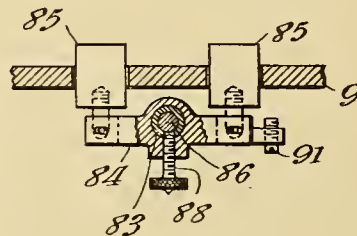
Patented Dec. 1, 1914.

5 SHEETS—SHEET 5.

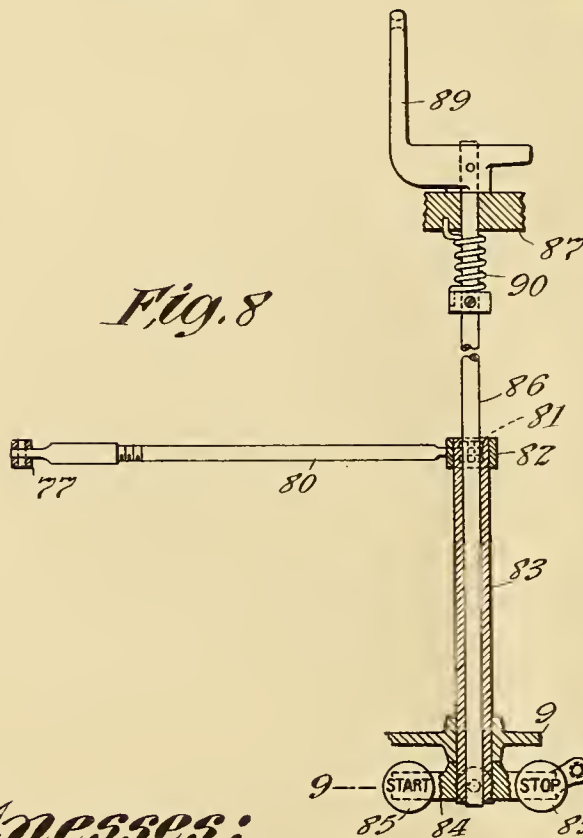
*Fig. 7*



*Fig. 9*



*Fig. 8*



*Witnesses:*  
 Frank D. Lewis  
 Delos Holden

*Inventor:*  
 Charles L. Hibbard  
 by Frank L. Brown  
 Atty.



# UNITED STATES PATENT OFFICE.

CHARLES L. HIBBARD, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,119,157.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed November 22, 1907. Serial No. 403,299.

*To all whom it may concern:*

Be it known that I, CHARLES L. HIBBARD, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention has for its object the provision of improvements in phonographs which are adapted more particularly for use for commercial purposes, although obviously the invention may be used in connection with other types of phonographs.

Among the features of novelty of the present invention are an improved recorder and reproducer support carried by the traveling carriage or carrier arm, and the provision of means for operating said support so as to bring either the recorder or reproducer into operative position with respect to the record surface, or for bringing the parts into such position that both the recording and reproducing styluses are entirely clear of the record surface, so that the record cylinder can be removed from or placed on the mandrel without contacting with either of said styluses, and the traveling carriage can be shifted without injury to either the record or reproducer and recorder. The traveling carriage is provided with a sound conveying tube to which an amplifying device or sound conveying tube may be applied, and the said tube is in communication with sound conveying ducts formed within the frame or support which carries the recorder and reproducer, the arrangement being preferably such that when the recorder is in operative position, there will be a sound passage leading in a straight line through the tube carried by the carriage to the interior of the recorder sound box and the reproducer will be cut out; and when the reproducer is in operative position, a devious or indirect sound passage will lead to the reproducer and the recorder will be entirely out of communication therewith. Indicating means are also provided for showing when the recorder and reproducer are respectively in operative position, and when both are in inoperative position. Means are also provided for locking the end gate which carries the outer bearing for the mandrel shaft, so that the end gate cannot be moved when either the recorder or reproducer is in operative

position, the end gate being unlocked when both the recorder and reproducer are in inoperative position, that is, with their styluses clear of the record cylinder. Means are also provided for moving the feed nut from engagement with the feed screw when the recorder and reproducer are in inoperative position. My invention also comprises improved details of construction which will be hereinafter fully set forth and claimed.

Reference is hereby made to the accompanying drawing, of which—

Figure 1 is a plan view of a phonograph constructed in accordance with my invention; Fig. 2 is an end elevation of the same looking toward the right in Fig. 1; Fig. 3 is a section on line 3—3 of Fig. 1; Fig. 4 is a rear elevation; Fig. 5 is a section on line 5—5 of Fig. 1 showing also an improved form of sound tube coupling applied to the traveling carriage; Fig. 6 is a detail section on line 6—6 of Fig. 5; Fig. 7 is a section on line 7—7 of Fig. 1 and shows the means for starting and stopping the mandrel; Fig. 8 is a plan view partly in section of certain parts of the starting and stopping mechanism of Fig. 7, and Fig. 9 is a section on line 9—9 of Fig. 8.

In all of the views corresponding parts are designated by the same reference numerals.

The phonograph shown comprises a mandrel shaft 1 and mandrel 2 mounted thereon, the outer end of the mandrel shaft being formed with a pivot 3 which engages a longitudinally adjustable bearing 4 carried by the end gate 5 and secured in any desired position by the set screw 10. The inner end of the shaft 1 is formed with a tapering shoulder 6, and an extension 7 of reduced diameter, said latter parts being journaled in a bearing 8 of corresponding shape and carried by an upright formed integral with the body or bed plate 9 (see Fig. 7). This form of bearing is advantageous since any play which may be caused by wear between the shaft and its bearings may be taken up by a slight longitudinal movement of the mandrel shaft 1, effected by properly adjusting the pivot block 4 carried by the end gate 5. A spur gear 11 is fixed to the inner end of the shaft 1 and drives the feed screw shaft 12 by means of the gear train 13. The said feed screw shaft 12 is provided with the usual thread for engagement with



the feed nut 14 for imparting a progressive forward movement to the sound box carrier arm or traveling carriage 15. This carriage is in the form of a yoke extending transversely with respect to the mandrel and sleeved at its rear upon the rod 16. The feed nut 14 is mounted on the end of a flat spring 17 which is secured to the carriage 15 by the screw 18. This spring is so arranged as to normally hold the feed nut 14 in engagement with the feed screw 12, and means are provided for pressing the spring 17 forward so as to release the feed nut from the feed screw when the recorder and reproducer are in inoperative positions, as will be hereinafter described. The forward end of the carriage 15 rests upon the horizontal rod 19, which is carried by the body 9, and said end is provided with an extension 20, which may be used for manually shifting said carriage.

The carriage is capable of being raised so as to turn upon the guide rod 16 and be thrown back so as to fully expose the recorder and reproducer for any desired manipulation. Means are provided for locking the carriage in its operative position, said means consisting of a latch 21 pivoted on the screw 22 and provided with a hook 23 which is normally in engagement with the rod 19, as shown in Fig. 5. In this position the latch 21 locks the carriage 15. Upon turning the latch 21 upon its pivot, however, the carriage is unlocked from the rod 19 and may be raised as above described. As soon as the latch 21 clears the rod 19, it falls into such a position that when the carrier arm is returned to the position indicated in dotted lines in Fig. 5, the latch 21 rests upon the upper surface of the rod 19, and the carriage may of course be moved freely upon the guide rod 16. The latch 21 cannot move on its pivot beyond the position shown on account of the engagement of a stop 24 carried by the end of the latch in position to engage the carrier arm.

The reproducer 25 and recorder 26 may be of any approved construction, but I prefer to use the particular form disclosed in United States Patent No. 855,828 granted June 4, 1907, to Edward L. Aiken. These instruments are carried by a supporting frame or slide 27, being inserted therein as shown in Figs. 2 and 3, and secured by the clamping screws 28. The slide 27, the details of which are shown in Figs. 3 and 6, comprises a body formed with two sound ducts or passages 29 and 30, one of which leads to the reproducer and the other to the recorder. When the reproducer is in operative position, as shown in Fig. 3, the passage 29 is in direct communication with the tube 31, carried by the carriage 15 and adapted to receive the usual amplifying horn or sound conveying tube. When the slide 27

is moved so as to bring the recorder into operative position the sound passage 30 is in direct communication with the tube 31. It will be observed that the arrangement is such that when the recorder is in position there is a direct and straight sound passage through the tube 31 into the sound box of the recorder, so that the sound waves will not be weakened by deflection, whereby the full force of the waves is utilized for cutting the record groove. On the other hand, when the reproducer is in operative position, the air passage between the interior of the sound box and the tube 31 will be somewhat devious whereby certain of the sound waves will be somewhat weakened, thus producing the effect of a tone modifier or purifier for cutting down the strength and improving the quality of the sound waves, as is desirable in instruments of this character. It should furthermore be noted that the sound passages 29 and 30 are entirely separate from each other, and that only one of these passages will be in communication with the tube 31 during the operation of the instrument, whether for recording or reproducing.

The upper surface of the slide 27 and the lower surface of the carrier arm 15, are planed off to fit closely together and prevent the escape of sound waves. These two parts are held in engagement by means of a pair of guide plates 32 which are secured by screws 33 to the carrier arm 15, said plates being formed with horizontal flanges 34 which engage corresponding grooves 35 formed in the side walls of the slide 27. Means for operating the slide and thereby bringing either the recorder or reproducer into operative position as desired, or bringing both out of operative position, are provided, and as shown, consist of a hand lever 35 pivoted on a screw 36 carried by the arm 15, the lower portion of said lever being enlarged to form a toothed sector 37, which engages a rack 38 formed on the flange 39 of a plate 40 secured to the bottom of the slide 27 by screws 41.

Means are provided for holding the slide 27 in three distinct positions, the first of which is the position in which the recorder will be in operative position with respect to the record surface (Fig. 2); the next position of the slide is an intermediate position in which neither the recorder nor reproducer will be in operative position (Fig. 5), and finally there is a position in which the reproducer will be in operative position (Fig. 3). The said means for holding the slide, as shown in Fig. 6, consists of a plug 42 situated in a recess 43 formed in the carrier arm 15. The lower end of this plug is rounded and the slide 27 is formed with rounded depressions 44 adapted to be engaged by the end of the plug 42, a small spring 45 being placed above the plug in



order to press it downwardly into engagement with one of said sockets. Said sockets are three in number and are so placed as to receive the plug 42 in each of the three positions of the slide 27, as previously set forth.

In order to indicate to the user the various positions of the slide 27, an indicator plate 46 is preferably secured to the upper side of the arm 15, as shown. This plate is provided with the words "Reproducer", "Off" and "Recorder", and these words are so placed that when the slide is in such position that the recorder is operative with respect to the record, the pin 47 carried by the lever 35 will be opposite the word "Recorder". When the lever 35 is moved so as to bring the pin 47 opposite the word "Off", the reproducer and recorder styluses will both be off the record surface, and when the pin 47 is opposite the word "Reproducer", the reproducer will be in operative position with respect to the record surface. Thus, the user can tell whether the instrument is in suitable position for recording or for reproducing, or for shifting the carriage or changing the record cylinder by merely glancing at the plate 46, and noticing which word the pin 47 indicates.

As I have previously stated the record cylinder should not be removed from or applied to the mandrel except when both the recorder and reproducer are in inoperative position, so that the styluses are removed from the record surface, in which case the pin 47 of the lever 35 will be opposite the word "Off". In order, however, that the user, through carelessness, shall not be able to remove or apply a record unless the parts are in proper position, I have provided means for locking the end gate 5 in its closed position whenever either the reproducer or recorder is in operative position, and for releasing the end gate only when the indicating pin 47 is opposite the word "Off" on the plate 46. These means comprise the following instrumentalities: A link 48 is pivoted at one end on a screw 49, carried by the slide 27, said link being connected at its other end by a pivot pin 50 with an annular member 51. This member is mounted upon the sleeve 52 to which the carrier arm 15 is clamped, and is capable of oscillation thereon, concentric with the guide rod 16. The lower portion of the ring 51 is formed with a cam surface 53, which bears against a longitudinally extending curved plate 54. This plate extends parallel with the guide rod 16 and feed screw 12, so that the ring 51 will be above said plate in any position to which it may be brought by the traveling carriage 15, and said plate is provided with rearwardly extending ears 55 which are pivoted upon screws 56 carried by standards 57 integral with the body 9. The plate 54 is so curved

as to partly inclose the feed screw 12 and act as a shield or guard for said screw. A coil spring 58 is applied to said plate 54 in such a way as to tend to move it from the position shown in Fig. 5, to that shown in Fig. 2, and therefore holds it against the cam surface 53 of the ring 51. When in the position of Fig. 2 and Fig. 4, the plate locks the end gate in closed position, by preventing inward movement of the rearward extension 59 of the end gate (see Figs. 1 and 4). The plate 54 will be in locking position at all times except when both the recorder and reproducer styluses are off the record, as shown in Fig. 5, in which case the cam surface 53 of the ring 51 presses the plate 54 down, thereby making it possible for the extension 59 of the end gate 5 to clear the plate 54. A spring 61 is secured to the upright 62 of the body 9, and is adapted to engage the rear end of the extension 59 on the end gate when the latter is in its closed position, as shown in Fig. 1, said spring acting as a latch for said end gate for holding it in its closed position, but said spring releases said extension 59 when pressure is applied to the end gate to open it, the handle 60 being provided for this purpose.

The ring 51, in addition to carrying means for causing the unlocking of the end gate, is also provided with means in the form of a cam surface 63 for pressing the feed nut spring 17, and thereby releasing the feed nut 14 from engagement with the feed screw 12, when the recorder and reproducer are in an off position, as shown in Fig. 5. When either the recorder or reproducer is in an operative position, the ring 51 will be in such position that the feed nut will engage the feed screw.

In order to indicate the position of the recorder or reproducer with respect to the surface of the record cylinder, a scale 64 is attached to or formed upon the front rod 19 and an index finger 65 is applied to the latch 21 in proper position for coöperating with the scale 64. In order to afford a signal to the user that the carrier arm is near the end of the record cylinder, a bell 66 is applied to the body 9, and the same is adapted to be operated by a vertical rock shaft 67, which is journaled within the body 9, and is provided with a rearward extension or projection 68, which is in the path of a pawl 69 (see Fig. 5), which is pivoted to the forward portion of the arm 15.

I will now describe the mechanism for starting and stopping the rotation of the mandrel shaft 1. Within the upright 70 of the base 9, and secured by a set screw 71, is a sleeve 72 which forms a bearing for a shaft 73 upon one end of which is secured a driving pulley 74 which may be continuously operated by a belt from any suitable



motor, such as an electric motor, and upon the opposite end of the shaft 73 is secured a clutch member 75. Upon the reduced end of the shaft 1 is a slidable clutch member 76; having teeth adapted to engage the teeth of the clutch member 75, in the usual manner (see Fig. 1), in which case the shaft 1 will be driven by the shaft 73. The clutch member 76 is adapted to be operated by a lever 77, pivoted at 79 and formed with a fork at its upper end, which engages a groove 78 formed in the clutch member 76. Pivoted to the lower end of the lever 77 is a link 80 which at its opposite end is pivoted to an arm 81 projecting downward from a sleeve 82 secured upon one end of the tubular shaft 83. The link 80, as shown, is composed of a rod threaded within a sleeve whereby the length of the link may be adjusted as will be evident. Upon the forward end of the hollow shaft 83 is secured a beam 84, and connected to the respective ends of the said beam are a pair of buttons 85, which may be marked respectively "Start" and "Stop" (see Fig. 8). The parts described are so arranged that upon depressing the left hand button as shown in Fig. 7, the link 80 will be drawn toward the right, and the upper end of the lever 77 moved to the left thereby bringing the clutch member 76 into engagement with the clutch member 75. Upon depressing the right hand button the clutch member 76 will be brought out of engagement with the clutch member 75, and the mandrel will therefore be stopped. These buttons are adapted to be operated by the finger of the person using the instrument. In some cases, however, it is desirable to effect the starting and stopping of the mandrel by a pedal or foot device, and in order that the mandrel may be operated according to either of these methods, I provide a shaft 86 which is sleeved within the hollow shaft 83 and extends rearward through the cabinet of the machine, being sleeved within a downwardly extending lug 87, which is integral with the body 9. The shaft 86 may be operatively connected with the sleeve 83 by a thumb screw 88, which is threaded in the beam 84, and is adapted to pass through an opening in the sleeve 83, so as to act as a set screw for uniting the shaft 86 with the said sleeve and beam. When the screw 88 is in the position of Fig. 9, the sleeve 83 cannot be operated by the shaft 86. This shaft may be connected to any kind of an operating device and for this purpose I attach to the rear end of the shaft an angular arm 89. A coil spring 90 is applied to the shaft 86 in such a way as to tend to rotate the shaft in the direction for stopping the rotation of the mandrel. When the shaft is operated to start the mandrel the spring is placed under elastic stress, and upon the

shaft 86 being released the spring 90 restores the shaft 86 to its original position, thereby separating the clutch members 76 and 75 and causing the mandrel to cease rotation. A screw 91 is threaded in one end of the beam 84 and acts as an adjustable stop for the same, by engagement with the body 9.

The upper end of the sound conveying tube 31 forms a nipple upon which may be placed the combined coupling and horn support which comprises a body 92 having an opening adapted to fit snugly upon the end of the tube 31, and a rounded annular flange 93 adapted to cooperate with a similar flange 94 carried by the tube 95 forming therewith a hollow ball and socket joint. The body 92 is also provided with an arm 96 rigid therewith and provided with a screw 97, which passes through a slot 98 formed in a link 99. A nut 100 is provided for drawing the head of the screw against the link 99, thereby clamping the link to said arm 96. One end of the link 99 is pivoted at 101 to an arm 102 extending downward from a ring 103, which surrounds and is pinned to the tube 95. The parts described provide means for angularly adjusting the tube 95 with respect to the body 92 and locking the same together in any desired position of adjustment. The tube 95 may be used as a nipple upon which to place an amplifying horn 104 or other sound conveying tube, or, if desired, the tube 95 may be integral with such horn or sound conducting tube, or may be secured thereto in any desired manner.

The coupling just described is preferably used in connection with an amplifying horn 104 for recording or reproducing. In case a listening tube is used, I prefer to connect the same with the tube 31 by the device shown in Fig. 3 which consists of a plug 105 fitting closely within said tube 31 and having a shoulder 106 adapted to engage the end thereof. The plug is formed with a central bore 107 and a nipple 108 upon which the end of a rubber tube 109 may be placed. This device fills up the space within the tube 31, thereby preventing resonance and purifying the tone of the instrument during reproduction. It may, of course, be entirely removed when the phonograph is used for recording.

Inasmuch as the position of a given record upon the mandrel depends upon the relative sizes of the bore of the record and the exterior of the mandrel, owing to the tapered form of these parts, a change of temperature may cause a record when the attempt is made to reproduce it to assume a position with respect to the mandrel in which it is farther to the left than when the record was made, so that the reproducer carriage must be capable of occupying a position farther to the left than that in which it was started when the record was made (on either the



same or a similar machine). In order that this may be always possible, I provide a movable stop 110, which normally occupies a position, (see Figs. 1, 2 and 4) in which it is in the path of the sleeve 52, to which the carriage is secured, and therefore determines the point upon the record surface at which the record may be started. This stop, as shown, is in the form of a lever pivoted on a screw 111, secured to the frame, and having a lug 112, said lever hanging by gravity in the position of Fig. 2, wherein the short end of the lever abuts against the rod 16. In this position the lug 112 is in the path of the sleeve 52, when moved toward the left. Whenever it is necessary to move the said sleeve farther toward the left, the lever 110 may be turned on its pivot, until the lug 112 clears the sleeve 52, in which case, the sleeve may be moved until it contacts with that part of the frame which carries the end of the rod 16. As soon as the sleeve 52 is fed far enough toward the right, the lever 110 will drop into its normal position, in which it acts as a stop for said sleeve.

Having now described my invention, what I claim is:

1. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a frame carrying a recorder and a reproducer having separate sound boxes arranged on opposite sides of the axis of said support, and a second support along which said frame is slidable in a direction transverse to the axis of the record tablet support for bringing either said reproducer or said recorder into operative engagement with the record tablet surface, substantially as described.

2. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a hollow frame, a recorder comprising a sound box in communication with the interior of said frame, a reproducer comprising a sound box separate and distinct from that of said recorder, said reproducer sound box being also in communication with the interior of said frame, a traveling carriage and means for movably supporting the said frame upon said carriage in such a manner as to permit either the recorder or reproducer to be brought into engagement with the record surface as desired, substantially as set forth.

3. In a phonograph or talking machine, the combination of a record tablet support and means for rotating the same, a carriage movable transversely with respect to said record surface, a sound conveying tube and a hollow frame carried by said carriage, a recorder and a reproducer having separate sound boxes carried by said hollow frame with their sound boxes in communication with the interior thereof and said interior

being in communication with the tube carried by said carriage, and means for shifting said frame with respect to said carriage for bringing said recorder and reproducer into and out of operative position with respect to the record surface, substantially as set forth.

4. In a phonograph or talking machine, the combination of a sound record tablet support and means for rotating the same, a frame, a reproducer and a recorder having separate sound boxes, said frame having sound passages formed therein, said passages being separate from and out of communication with each other and leading respectively to the sound boxes of the recorder and reproducer, a sound conveying tube, and means for movably supporting said frame with respect to said tube whereby either of said sound passages may be brought into connection with said sound tube to the exclusion of the other, substantially as set forth.

5. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a carriage movable in a direction transverse to the direction of movement of the record surface, a frame carrying a recorder and a reproducer having separate sound boxes, said frame having sound passages formed therein, separate from and out of communication with each other, and leading respectively to the sound boxes of the recorder and reproducer, and said frame being slidably mounted upon said carriage, a sound conveying tube and means for so sliding said frame with respect to said carriage that either of said sound passages may be brought into connection with said sound tube to the exclusion of the other, substantially as set forth.

6. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a carriage movable in a direction transverse to the direction of movement of the record surface, a slide mounted upon said carriage for supporting the recorder and reproducer, means for moving said slide with respect to said carriage, means for guiding said slide in such movement, so arranged as to prevent escape of air between said slide and carriage, and indicating means for designating the position of said slide with respect to said carriage, substantially as set forth.

7. In a phonograph or talking machine, the combination of a rotatable record support, traveling carriage, and slide carried by said carriage, said carriage being provided with a sound conveying tube stationary relatively to said carriage, and said slide being provided with a recorder and a sound duct leading into the sound box thereof and being movable in a line lying in a



plane transverse to the axis of the record support for moving said recorder into and out of operative position with respect to the record surface, said sound duct being so situated as to form with said sound tube a straight direct path into the sound box of the recorder when the latter is in operative position with respect to the record surface, substantially as set forth.

8. In a phonograph or talking machine, the combination of a traveling carriage and slide carried thereby, said carriage being provided with a sound conveying tube and said slide being provided with a reproducer and a sound duct leading into the sound box thereof, said sound duct being so situated as to form with said sound conveying tube an indirect or devious path into the sound box of the reproducer when the latter is in operative position with respect to the record surface, substantially as set forth.

9. In a phonograph or talking machine, the combination of the traveling carriage having a sound conveying tube, a hollow frame carried by and movable with respect to said carriage, a recorder and a reproducer having separate sound boxes and sound passages formed in said frame, said passages being separate from and out of communication with each other and leading respectively to the sound boxes of the recorder and reproducer, and being so formed as to provide a direct path to the recorder when the same is in operative position, and an indirect path to the reproducer when the latter is in operative position, substantially as set forth.

10. In a phonograph or talking machine, the combination of the rotating mandrel, traveling carriage and pivoted end gate carrying a bearing for the outer end of the mandrel, a plate extending along the path of said carriage and normally locking the end gate in closed position, and means carried by said carriage for engaging said plate to unlock the end gate, substantially as set forth.

11. In a phonograph or talking machine, the combination of the rotating mandrel, traveling carriage and pivoted end gate carrying a bearing for the outer end of the mandrel, a movable support for the reproducer or recorder carried by said carriage, means for locking the end gate in closed position, and means actuated by the movement of said support for unlocking the end gate, substantially as set forth.

12. In a phonograph or talking machine, the combination of the rotating mandrel, traveling carriage and pivoted end gate carrying a bearing for the outer end of the mandrel, a movable support for the reproducer or recorder, means for locking the end gate in closed position and means actuated

by the movement of said support and operating to simultaneously move the recorder or reproducer out of engagement with the record and unlock the end gate, substantially as set forth.

13. In a phonograph or talking machine, the combination of the mandrel, feed screw, traveling carriage and pivoted end gate carrying a bearing for the outer end of the mandrel, a curved plate forming a guard for the feed screw and normally locking the end gate in closed position, and means for moving said plate to unlock the end gate, substantially as set forth.

14. In a phonograph or talking machine, the combination of the rotatable record support, feed screw, traveling carriage and feed nut carried thereby, a reproducer and a recorder having separate sound boxes, a supporting device for said reproducer and recorder carried by and movable with respect to said carriage, means for moving said device in a straight line extending transversely with respect to said record support, and means actuated by the movement of said device relatively to said record support for causing the disengagement of the feed nut from the feed screw, substantially as set forth.

15. In a phonograph or talking machine, the combination of the mandrel, traveling carriage, pivoted end gate carrying a bearing for the outer end of the mandrel, means for locking the end gate in closed position, a cam carried by said carriage for unlocking the end gate, and means for operating said cam, substantially as set forth.

16. In a phonograph or talking machine, the combination of the traveling carriage and slide carried thereby, means for operating said slide to progress the same with respect to said carriage in a straight line, and locking means for holding said slide in fixed position with respect to said carriage, said means comprising a spring operated pin in one member co-acting with spaced recesses in the other member, substantially as set forth.

17. In a phonograph or talking machine, the combination with the rotating mandrel, traveling carriage and the stylus carried thereby, of means for preventing the removal of a record from or the insertion of a record upon said mandrel, a movable plate extending along the path of said carriage positioned to render said preventing means effective or ineffective, and means carried by said carriage for moving said plate to render said preventing means effective or ineffective, substantially as set forth.

18. In a phonograph or talking machine, the combination with the rotating mandrel, traveling carriage and the stylus carried thereby, of means for locating said stylus



in "on" or "off" position with respect to the record on said mandrel, means for preventing the removal of a record from or the insertion of a record upon said mandrel, a movable plate extending along the path of said carriage positioned to render said preventing means effective, and means carried by said carriage and movable with said stylus-locating means for moving said plate to render ineffective said preventing means when said stylus is located in "off" position, substantially as set forth.

19. In a phonograph or talking machine, the combination with the rotating mandrel, traveling carriage and the stylus carried thereby, of means for preventing the removal of a record from or the insertion of a record upon said mandrel, a support for said stylus movable with respect to said carriage, and means actuated by the movement of said support with respect to said carriage for rendering said preventing means effective or ineffective, substantially as set forth.

20. In a phonograph or talking machine, the combination of the mandrel, feed screw, traveling carriage, means for preventing the removal of a record from or the insertion of a record upon said mandrel, a curved plate forming a guard for the feed screw and normally acting to hold said preventing means in operative position, and means for moving said plate to render said preventing means ineffective, substantially as set forth.

21. In a phonograph or talking machine, the combination of the mandrel, traveling carriage, a slide carried by said carriage and movable with respect thereto, a stylus carried by said slide and adapted to be located with respect to a record on said mandrel by such relative movement of said slide, means for preventing the removal of a record from or the insertion of a record upon said mandrel, and means operated by movement of said slide relative to said carriage for rendering said preventing means effective or ineffective, substantially as set forth.

22. In a phonograph or talking machine, the combination of the mandrel, traveling carriage, a slide carried by said carriage and movable with respect thereto, a stylus carried by said slide and adapted to be located with respect to a record on said mandrel by such relative movement of said slide, a feed screw, a pivoted guard therefor, and means for oscillating said guard by movement of said slide, substantially as set forth.

23. In a phonograph or talking machine, the combination of the mandrel, traveling carriage, means for preventing the removal of a record from or the insertion of a record

upon said mandrel, a cam carried by said carriage and movable to render said preventing means effective or ineffective, and means for thus moving said cam, substantially as set forth.

24. In a phonograph or talking machine, the combination with a support for a record tablet, means for rotating the same, and an arm having a sound conveying passage therein, said arm and record support having a relative feeding movement in a direction transverse to the direction of the rotary movement of the record surface, of a slide mounted upon said arm, said slide carrying two sound boxes each having a diaphragm mounted therein, the sound passages of the sound boxes being separate and out of communication with each other, and means for so shifting said slide with respect to said arm that the sound passage of either of said sound boxes may be brought into communication with said sound conveying passage of said arm to the exclusion of the other, substantially as set forth.

25. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a carriage movable in a direction transverse to the direction of movement of the record surface, a slide mounted upon said carriage, said slide carrying two sound boxes each having a diaphragm mounted therein, the sound passages of the sound boxes being separate and out of communication with each other, a sound conveying tube mounted on said carriage, and means for so shifting said slide with respect to said carriage that the sound passage of either of said sound boxes may be brought into communication with said sound conveying tube to the exclusion of the other, substantially as set forth.

26. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a carriage having a sound conveying passage therein and movable in a direction transverse to the movement of the record surface, and a slide supporting a plurality of sound boxes each provided with a diaphragm, the said slide being movable upon said carriage so as to bring either sound box and diaphragm into operative position and being supported by said carriage in close contact therewith so that an air tight connection is formed between the sound passages of said sound boxes and said carriage, substantially as set forth.

27. In a phonograph, the combination with a carriage provided with a way, of a plurality of sound boxes movably mounted on said way and respectively adapted to be brought into operative position.

28. In a phonograph, the combination of a carriage provided with a way, a cover for

said way having sound-conveying connections, and a plurality of sound boxes mounted on said way beneath said cover and respectively adapted to be brought into register with said connections.

29. In a phonograph, the combination of a carriage provided with a way; two sound boxes movably mounted on said way and provided with a rack, a sound box being operatively disposed when occupying a position on said way intermediate between the ends thereof; and a member rotatably mounted on said carriage and provided with gear teeth engaging such rack, whereby either sound box may be operatively positioned as desired.

30. In a phonograph or talking machine, the combination of a support for a record tablet and means for rotating the same, a carriage movable in a direction transverse to the direction of movement of the record surface, a slide mounted upon said carriage, said slide carrying two sound boxes each

having a diaphragm mounted therein, a sound conveying tube mounted on said carriage, and means for so shifting said slide with respect to said carriage that either of said sound boxes may be brought into communication with said sound conveying tube to the exclusion of the other, substantially as set forth.

31. In a phonograph or talking machine, the combination of a support for a record tablet, a second support provided with a way, and a plurality of sound boxes movably mounted on said way and respectively adapted to be brought into operative position with respect to the surface of the record tablet, substantially as described.

This specification signed and witnessed this 21st day of November, 1907.

CHAS. L. HIBBARD.

Witnesses:

FRANK D. LEWIS,  
CHAS. F. ROBSON.

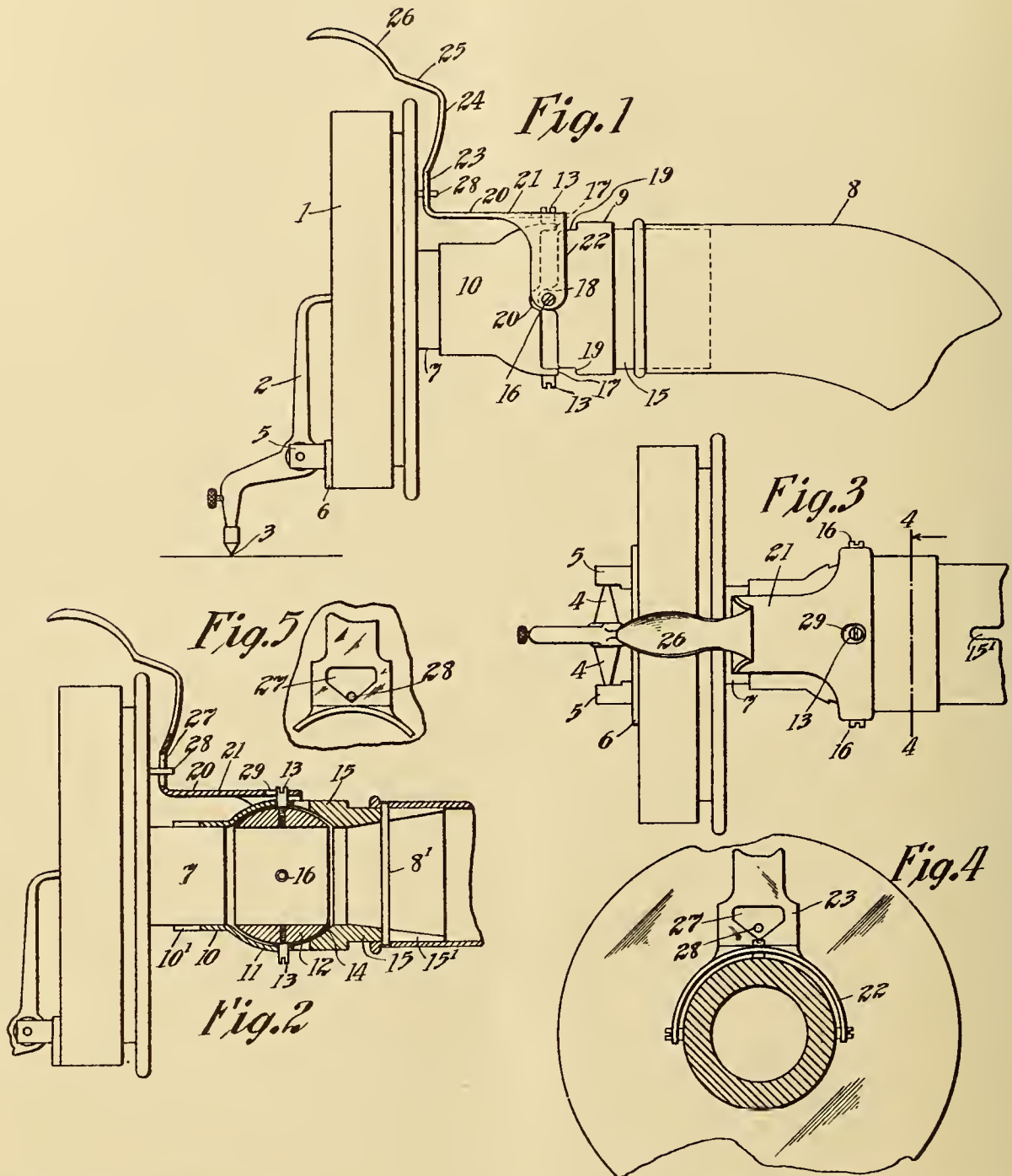
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





1,119,269.

Patented Dec. 1, 1914.



*Witnesses:*

*St. Dresser*  
*Fredrick Bachmann*

*Inventor:*

*Adolph F. Gall*  
*by Frank W. Brown*  
*his Atty.*

# UNITED STATES PATENT OFFICE.

ADOLPH F. GALL, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,119,269.

Specification of Letters Patent.

Patented Dec. 1, 1914.

Application filed April 5, 1911. Serial No. 619,002.

*To all whom it may concern:*

Be it known that I, ADOLPH F. GALL, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to an improved connection between the reproducer and sound conveying or reproducer arm of a phonograph.

The principal object of my invention is to provide an improved connection particularly adapted for use with a mechanically fed sound conveying arm whereby the reproducer is capable of adjusting itself to irregularities in the record groove and of being readily lifted from the record surface.

Another object of my invention is to provide an improved means for lifting the reproducer and positioning the same on the record surface.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawing forming part of this specification and in which—

Figure 1 is a side elevation of my improved device applied to a reproducer and reproducer arm; Fig. 2 is a central vertical section of the reproducer arm and my improved connection, the reproducer being shown in side elevation; Fig. 3 is a plan view of the reproducer and the connection for securing the same to the reproducer arm; Fig. 4 is a section taken on line 4—4 of Fig. 3; and Fig. 5 is a fragmentary elevation of my improved positioning means.

In all the views, like parts are designated by the same reference numerals.

Referring to the drawings, the numeral 1 represents a reproducer provided with a stylus arm 2 having connected therewith at its lower end a reproducing stylus 3. The arm 2 is provided on opposite sides thereof with pivots 4, whereby the same is pivotally mounted in brackets 5 mounted on a plate 6 which is secured in any desired way to the body of the reproducer.

The numeral 7 represents a hollow neck adapted to be connected with the sound con-

veying arm 8 by a hollow connection 9 so that the sound vibrations may be transmitted from the reproducer to any suitable amplifying means (not shown). The connection 9 comprises a hollow member 10 adapted to be detachably engaged with the outer surface of the neck 7, the member 10 being provided with a substantially hemispherical socket 11 adapted to receive a sound conveying member 12 having a curved outer surface fitting loosely in the socket 11. The member 10 is connected to the member 12 by alined pivots 13, on which it is horizontally movable. The side of the member 12 opposite to that engaged within the member 10, fits loosely in the substantially hemispherical socket 14 formed in a sound conveying member 15 which is adapted to detachably engage within the sound conveying arm 8, the member 15 being pivoted for vertical movement relatively to the member 12 by alined pivots 16 secured to the member 12 and having their axes at right angles to the axes of the pivots 13. The axes of the pivots 13 and 16, as shown in the drawing, all lie substantially in the same plane. In order to permit free movement of the member 10 with respect to the member 15, these members are spaced a slight distance apart, as shown in Fig. 1, the pivots 13 and 16 extending through ears or projections 17 and 18 respectively on the members 10 and 15 respectively. Recesses 19 and 20 of sufficient size to loosely receive the projections 17 and 18 but coacting therewith to limit the lateral as well as the up and down movement of the reproducer are formed opposite the said projections in the members 15 and 10 respectively. The members 10 and 15 are provided with open ended longitudinal slots 10' and 15' so as to permit them to yieldingly engage the neck 7 and the arm 8 respectively. The slots in each member are preferably placed diametrically opposite each other, those in the member 15 being adapted to engage a vertical rod 8' in the arm 8 to prevent the connection 9 from turning in the arm 8 and to limit the inward movement of said connection. By means of the above described connection, the reproducer is given sufficient play vertically and laterally of the record groove to permit it to follow the irregularities in the record surface.

For positioning the reproducer with re-



spect to the record surface, I provide an arm or lever 20 having a substantially flat horizontal portion 21 provided at its right hand end with a curved portion 22 embracing the member 12 and mounted at its ends on the pivots 16 outside of the projections 18. The opposite end of the portion 20 is provided with a substantially vertically extending portion 23 curved at its upper end as at 24 from which last named portion, the lever projects to the left as shown at 25, being provided at its left hand end with a finger hold 26. The portion 23 is provided with an aperture or recess 27 inclosing a pin or projection 28 secured to the reproducer. The aperture 27 is provided at its lower portion with inclined converging walls, as shown, and is of sufficient size to permit the projection 28 to move freely therein when the reproducer is tracking the record. By grasping the arm or lever 20 at the finger hold 26, the lever may be lifted to bring the projection 28 into engagement with the inclined walls of the aperture 27 so as to position the reproducer centrally with respect to the arm 8 as shown in Fig. 5 and also to permit raising of the reproducer from and positioning of the same on the record surface. The arm 20 has a tendency to move by gravity into engagement with the reproducer; and in order to prevent said engagement while the reproducer is tracking the record groove, a slot 29 is formed in the portion 21 of the said arm, the right hand end of this slot engaging with the upper pivot 13 to prevent downward movement of the left hand end of the said arm.

While I have described and shown the preferred embodiment of my invention, many changes may be made therein without departing from the spirit thereof; and I do not, therefore, wish to be limited to the specific structure shown and described.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:—

1. In a device of the class described, the combination of a sound conveyer, a reproducer, and a hollow member intermediate and communicating with said conveyer and reproducer, said conveyer and reproducer being pivotally connected to the outside of said member for movement respectively about axes lying at an angle to each other and substantially in the same plane, substantially as described.

2. In a device of the class described, the combination of a sound conveyer, a reproducer, and a member communicating with said conveyer and reproducer and having a curved outer surface, said conveyer and reproducer being provided with means fitting loosely about said curved outer surface and pivotally connected to said surface for

movement respectively about axes lying at an angle to each other and substantially in the same plane, substantially as described.

3. In a device of the class described, the combination of a hollow connection for a reproducer, a hollow connection for a sound conveyer, and a hollow member communicating with said connections, said connections being pivoted to the outside of said member for movement respectively about axes lying at right angles to each other and substantially in the same plane, substantially as described.

4. In a device of the class described, the combination of sound conveyer, a reproducer, and a member communicating with said conveyer and reproducer, said conveyer and reproducer being provided with means fitting loosely about the outer surface of said member and pivotally connected to said surface for movement respectively about axes lying at an angle to each other and substantially in the same plane, and said means being provided with means for limiting the relative movement of said conveyer and reproducer, substantially as described.

5. In a device of the class described, the combination of a sound conveyer, a reproducer, and a member communicating with said conveyer and reproducer, said conveyer and reproducer being provided with means fitting loosely about the outer surface of said member and pivotally connected to said surface for movement respectively about axes lying at an angle to each other and substantially in the same plane, and said means being provided with a projection for limiting the relative movement of said conveyer and reproducer, substantially as described.

6. In a device of the class described, the combination of a hollow reproducer connection provided with a projection, a second hollow connection provided with a projection, and a hollow member communicating with said connections, and means coacting with said projections for pivoting said connections to the outside of said member for movement respectively about axes lying at an angle to each other and substantially in the same plane, substantially as described.

7. In a device of the class described, the combination of a reproducer arm, a reproducer, a universal joint between said arm and reproduced, and a manually operable member extending upwardly from said joint for lifting said reproducer, said reproducer and member being provided with coacting means comprising a projection and an opening in which said projection is located, the walls of said opening normally permitting free universal movement of said reproducer but being adapted to engage said projection to permit the reproducer to be lifted by said member, substantially as described.



8. In a device of the class described, the combination of a reproducer arm, a reproducer, a connection between said arm and reproducer permitting up and down movement of said reproducer, lifting means for said reproducer comprising a member tending to move into engagement with said reproducer, and means normally preventing such engagement, substantially as described.

9. In a device of the class described, the combination of a reproducer arm, a reproducer, a connection between said arm and reproducer permitting up and down movement of said reproducer, lifting means for said reproducer comprising a lever tending to move into engagement with said reproducer, and means normally preventing such engagement, substantially as described.

10. In a device of the class described, the combination with a reproducer arm, a reproducer provided with a projection, and a universal joint between said arm and reproducer, of a pivoted arm or lever provided with an opening adapted to receive the projection on the reproducer, the said opening normally permitting free universal movement of said reproducer but having walls adapted to engage said projection to lift the reproducer from the record surface, substantially as described.

11. In a device of the class described, the combination with a reproducer arm, a reproducer provided with a projection, and a universal joint between said arm and reproducer, of a pivoted arm or lever provided with an opening adapted to receive the projection on the reproducer, the said opening normally permitting free universal move-

ment of said reproducer but having walls adapted to engage said projection to lift the reproducer from the record surface, and a stop to limit the downward movement of the said arm or lever, substantially as described.

12. In a device of the class described, the combination with a reproducer arm, a reproducer provided with a projection, and a universal joint between said arm and reproducer, of a pivoted arm or lever provided with an opening adapted to receive the projection on the reproducer, the said opening normally permitting free universal movement of said reproducer, but permitting engagement of said arm with said projection to lift the reproducer from the record surface, and to center the same with respect to said reproducer, substantially as described.

13. In a device of the class described, the combination of a hollow reproducer connection provided with a projection and a recess, a second hollow connection provided with a projection and a recess, a hollow member communicating with said connections, the projection on each of said connections being arranged opposite the recess in the other connection, and means coacting with said projections for pivoting said connections to said member for movement respectively about axes lying at an angle to each other, substantially as described.

This specification signed and witnessed this 3rd day of April 1911.

ADOLPH F. GALL.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first part of the book is devoted to a general introduction to the subject of the history of the English language. It begins with a discussion of the early history of the English language, from its roots in the Germanic languages to its development as a distinct language. The author then discusses the influence of Latin and French on the English language, and the role of the English language in the development of the English nation. The second part of the book is devoted to a detailed study of the English language in the Middle Ages. It begins with a discussion of the Old English language, and its development from the Germanic languages. The author then discusses the influence of Latin and French on the Middle English language, and the role of the Middle English language in the development of the English nation. The third part of the book is devoted to a detailed study of the English language in the modern period. It begins with a discussion of the Early Modern English language, and its development from the Middle English language. The author then discusses the influence of Latin and French on the Modern English language, and the role of the Modern English language in the development of the English nation.

The fourth part of the book is devoted to a detailed study of the English language in the modern period. It begins with a discussion of the Late Modern English language, and its development from the Early Modern English language. The author then discusses the influence of Latin and French on the Late Modern English language, and the role of the Late Modern English language in the development of the English nation. The fifth part of the book is devoted to a detailed study of the English language in the modern period. It begins with a discussion of the Contemporary English language, and its development from the Late Modern English language. The author then discusses the influence of Latin and French on the Contemporary English language, and the role of the Contemporary English language in the development of the English nation.

The book is written in a clear and concise style, and is suitable for students of the history of the English language.





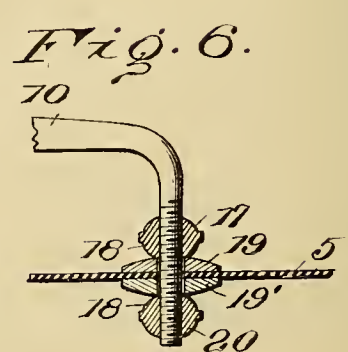
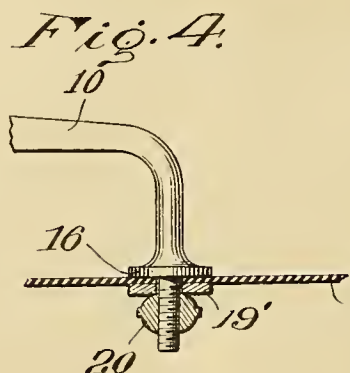
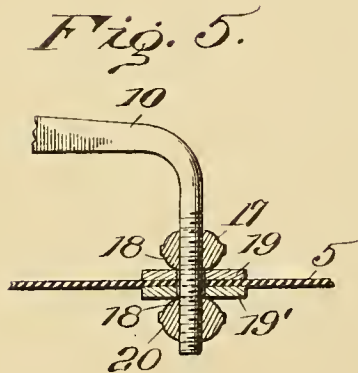
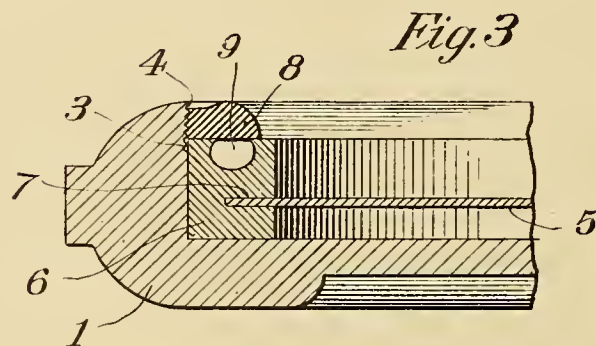
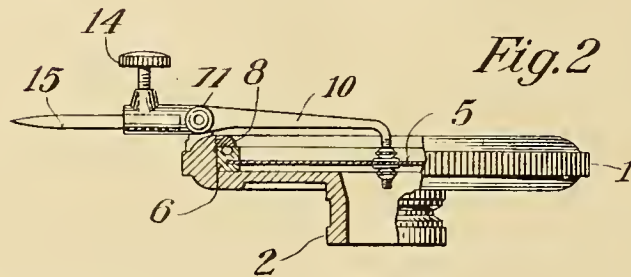
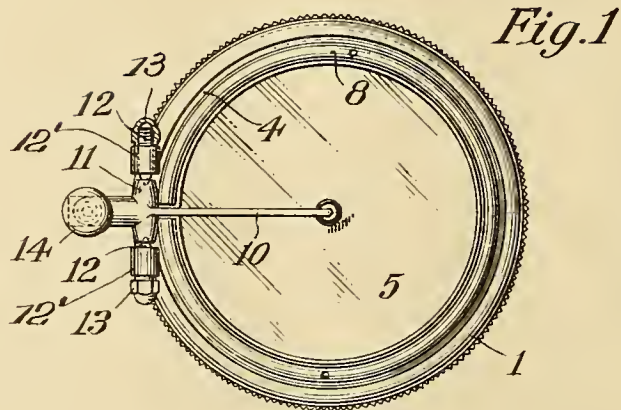
C. E. WOODS.

SOUND BOX.

APPLICATION FILED AUG. 26, 1913.

1,119,920.

Patented Dec. 8, 1914.



Witnesses,  
E. E. Warfield  
Jas. H. Anderson.

Inventor  
Clinton E. Woods.  
By his Attorneys  
Mauro, Cameron, Lewis & Massie.

# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-BOX.

1,119,920.

Specification of Letters Patent.

Patented Dec. 8, 1914.

Application filed August 26, 1913. Serial No. 786,730.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Sound-

Boxes, which improvement is fully set forth in the following specification.

This invention relates to sound boxes intended for use with laterally undulating or "zig-zag" sound records.

Heretofore in sound boxes for talking machines, it has been proposed to mount the diaphragm between two rings or gaskets of elastic material composed of a suitable length of small rubber tubing bent into circular form, the whole being secured in position in the diaphragm head under compression. In wholesale manufacturing operations, these pieces of small rubber tubing are liable to be cut either a fraction of an inch too long or too short, thereby causing either an overlapping of their adjacent ends or failure of the ends to meet when in position in the sound box. Moreover when the parts are assembled, it has been found that in many cases the compression is not uniform. Any or all of these causes give rise to variations and defects in the character of the reproduction.

In the manufacture of sound boxes prior to the present invention, various attempts have been made to secure the most advantageous relation between the stylus bar and its needle on the one hand, and the sound box and its diaphragm on the other. Spring tension has been applied in one direction or the other, and it has even been proposed to provide two opposing spring tensions in order to produce an equilibrium. But in manufacturing sound boxes on a large scale, it has been found impractical, because of the unavoidable variations (even though minute) in the quality of the springs and consequently their action upon the parts involved, to secure the desired equilibrium.

And this results in a great variation in the quality of the complete sound box and the character of the reproduction secured therefrom. Furthermore, it has been found difficult to secure the inner end of the stylus bar to the diaphragm in such a manner as to unite the same effectively to the diaphragm without danger of separation therefrom and without affecting the diaphragm

in such a manner as to injure or alter the reproduction or the vibration of the diaphragm under the influence of the undulations of the sound record. If the stylus bar is secured to the diaphragm by cement, it is found that it is liable to break loose, and moreover the cement itself is liable to extend over different areas in different specimens. When an effort is made to clamp the stylus bar to the diaphragm by a screw and nut construction, the tightening of the nut tends to distort the diaphragm and to place the same under a torsional strain at the point of union. These differences also tend to introduce variations in the character of the reproduction secured from sound boxes otherwise exactly alike. In short, in sound boxes as heretofore constructed, and particularly when manufactured in large numbers by a large number of workmen, it has been found exceedingly difficult to produce such sound boxes in large numbers which shall be uniformly perfect in the reproductions secured therefrom, because of variations in the gaskets and the compression thereof, because of the failure to secure exact equilibrium in the stylus bar mounting, and because of the failure to secure the stylus bar to the diaphragm effectively and at the same time without modifying the vibratory character of the diaphragm itself. The presence of any one or all of these defects results in variations in the character of the reproduction which cause the sound box, when tested at the factory, to be discarded, and in actual operation it has been found that a very large percentage of sound boxes, when tested, have to be discarded because of variations due to one or more of the causes mentioned above.

The object of the present invention is to provide a sound box which can be manufactured in wholesale quantities and which shall nevertheless give uniform results in the quality of the reproduction obtained thereby, which shall be simple in construction, easily assembled and disassembled for inspection or repair, and which can be manufactured at a minimum cost.

With these objects in view, the invention consists of a diaphragm mounted in a single integral ring of elastic material, such as soft rubber of fine quality, and secured in a head



in the form of a cup by any suitable means, such as a screw ring, for imparting uniform compression to the ring of elastic material, and a stylus bar preferably formed of a single piece of forged metal of uniform texture and quality pivotally mounted upon the frame of the sound box and securely attached to the diaphragm without placing the latter under any torsional strain. Preferably the inner end of the stylus bar is bent and screw-threaded and extended through a central opening in the diaphragm, with a small flat washer on either side of the diaphragm, which washers with the interposed diaphragm are clamped between two nuts screw-threaded onto the end of the needle bar. By this means, a sound box is secured which is exceedingly simple in construction and cheap to manufacture, but which nevertheless may be manufactured in large numbers by a large number of workmen without variation in the diaphragm mounting or the needle bar mounting, or in the attachment of the needle bar to the diaphragm, with the result that discards in the manufacture are almost entirely eliminated, and the quality of the reproduction secured is practically uniform.

The inventive idea involved is capable of having a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that the drawings are for the purpose of illustration only and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings:—Figure 1 is a plan view; Fig. 2 is a side elevation partly in section; Fig. 3 is an enlarged sectional detail showing the manner of mounting the diaphragm in the frame or support; and Figs. 4, 5 and 6 are detail views showing the manner of connecting the stylus bar to the diaphragm.

In said figures, in which like reference numerals indicate corresponding parts, 1 is the diaphragm frame or support, here shown in the form of a cup having formed integrally therewith a hub or neck 2 by means of which the sound box is connected to the tone arm. In the form chosen for illustration in the drawings, the diaphragm frame or support is in the form of a cup whose side walls 3 are arranged at right angles to the bottom of the cup, the upper portion of said side walls being formed with interior screw-threads 4, and the diaphragm 5, formed of any suitable or desired material is mounted in a single integral ring 6 formed of any highly resilient material, as soft rubber, the diaphragm being seated in an interior groove or slit formed in the ring 6, which ring is held in position by any suit-

able means for slightly compressing it and securing it in the frame or support 1, such means being here shown in the form of a ring or bezel 8, screw-threaded on its exterior periphery to engage the threads 4 in the frame or support. Preferably the diaphragm supporting ring 6 has formed on its face adjacent to the ring 8 a groove 9 which, when the ring 8 is in position, forms an air chamber. This groove 9 not only serves as an air cushion, but also provides a reduced portion of the rubber ring 6 on either side of the groove, upon which the ring 8 presses and thus insures, by reason of the reduced surface, a closer contact and more uniform bearing of the ring 8 upon the resilient ring 6. While the ring 8 is shown as a screw-threaded ring, any other suitable means may be employed for compressing and retaining the resilient ring 6 in position.

The stylus bar 10 is composed of a single piece of material, as drop-forged steel for example, and has two hubs 11 extending laterally from the sides thereof, the whole being preferably so proportioned that the center of gravity of the stylus bar is on a line passing through the center of its hubs, which hubs have countersunk recesses in their ends forming bearings for pivot pins 12 which are screw-threaded into ears 12' formed on or secured to the margin of the diaphragm frame or support and having conical points which enter the countersunk bearings in the hubs 11 of the stylus bar. These screw-threaded pins 12 have lock nuts 13 screwed on the outer ends thereof which project through the ears 12', thus enabling the pivot bearings to be precisely positioned and then locked securely in such position. The stylus bar is provided with the usual stylus receiving socket and set-screw 14 for securing the stylus 15 therein. The inner end of the stylus bar is turned at right angles to the main portion of the inner arm 10 and at its extreme end is screw-threaded to project through a central opening in the diaphragm, the stylus bar being provided with a suitable abutment against which the diaphragm takes bearing. This abutment may be in the form of a shoulder 16, either formed integrally with the stylus bar, as shown in Fig. 4, or preferably formed by a washer 19 abutting a nut 17 on the stylus bar, which nut is provided with a reduced surface close to the bar, which reduction is preferably secured by forming the nut either conical or spherical, as shown at 18. A washer 19 is then slipped over the stylus bar, which washer has a flat side adjacent to the diaphragm, the opposite side of the washer being either also flat or slightly convex, as shown in Fig. 6. A second washer corresponding to the washer 19 is then fitted over the stylus bar with the flat



side adjacent to the diaphragm, and the whole secured in position by a nut 20 screw-threaded onto the extreme end of the stylus bar, which nut has its spherical surface 18 adjacent the second washer 19', which second washer 19' may have its side adjacent to the second nut 20 either flat, as shown in Fig. 5, or convex, as shown in Fig. 6. In case the flat shoulder 16 is integral with the stylus bar, as shown in Fig. 4, the diaphragm bears against such flat faced shoulder and the washer 19' is then placed under the diaphragm and the convex faced nut 20 is screw-threaded thereon as in Figs. 5 and 6. And in either case, it will be observed that the surface of the tightening nut which bears against the washer is reduced to a minimum, thereby eliminating the liability of the nut imparting any turning action to the washer, consequently avoiding any tendency of placing torsional strain upon the diaphragm when the nut is tightened to lock the stylus bar to the diaphragm.

By mounting the diaphragm in the integral ring of soft rubber, the diaphragm is evenly and uniformly supported throughout its periphery and entirely restrained from coming into contact at any point with the metal of the frame or support, and as these rings can all be made in a suitable mold and of uniform material, all of the diaphragms (when the sound boxes are made in wholesale quantities) will be mounted under identically the same conditions, and the large body of resilient material constituting the ring supports the diaphragm yieldingly in the head of the sound box and tends to absorb any unusual shock due to undulations of great amplitude in the record groove, while at the same time transmitting with perfect accuracy the vibrations due to undulations of lesser amplitude, thereby avoiding what is commonly known as "blasts" in the reproduction. Moreover, the resiliency of the ring is materially enhanced by the presence of the air chamber secured by the groove 9, and the effective contact of the screw-threaded ring or bezel 8 with the rubber ring is also increased. By screw-threading the ring 8, means are provided whereby the compression of the ring 6 may be increased if found necessary for any reason, such as the aging of the rubber.

The uniformity of construction and the texture of the metal forming the stylus bar 10 is secured by drop-forging the bar, and the perfect equilibrium of the bar is secured by placing the axis or fulcrum of the bar on a line passing through the center of gravity of the bar. Moreover, the means by which the said bar is secured to the diaphragm are such that there is no danger of imparting any torsional or other strain to the diaphragm, and therefore the parts may

be assembled in large quantities by various workmen and at the same time secure perfectly uniform results.

It will be observed that the sound box constituting the present invention is one of few parts, great simplicity of construction, readily assembled under conditions guaranteeing uniformity of action, and that, the diaphragm and the stylus bar are normally in a state of equilibrium free from any tension or strain.

While, for the purpose of describing the invention, the same has been set forth with considerable particularity, it is not to be understood that the invention is confined to the specific details of construction or proportion and arrangement of parts herein set forth, since the same may be greatly varied within the limits of the appended claims, without departing from the invention.

What is claimed is:

1. In a sound box for talking machines, the combination of a diaphragm frame or support, a diaphragm yieldingly mounted in said frame or support; a stylus-bar pivotally mounted on said frame or support and extending parallel with said diaphragm with its inner end screw-threaded and bent at right angles to and extending through a central perforation in the diaphragm, a pair of flat washers on said stylus-bar and embracing said diaphragm, and two screw-threaded clamping nuts with spherical surfaces engaging the washers and clamping them against the diaphragm.

2. In a sound box for talking machines, the combination of a diaphragm frame or support, a ring of elastic material mounted in said frame or support and having an annular groove or slot formed in its interior wall to receive the diaphragm and an annular groove or air chamber on its outer face, a diaphragm mounted in said interior groove or slot, and means retaining said ring in said frame or support under pressure and sealing said air chamber or groove.

3. In a sound box for talking machines, the combination of a diaphragm frame or support and a diaphragm yieldingly mounted therein, with a stylus-bar pivotally mounted on said frame or support and provided with a screw-threaded arm having a shoulder thereon, said arm extending through a central perforation in the diaphragm with the said shoulder abutting one face of the diaphragm, a flat faced washer on said screw-threaded arm and abutting the other face of the diaphragm, and a nut on said arm and having a spherical face bearing against said washer.

4. In a sound box for talking machines, the combination of a diaphragm frame or support, a soft rubber ring rectangular in cross-section mounted in said frame or sup-

port and having an annular air-chamber in one of its lateral faces, a diaphragm carried in an interior annular slit in said ring, and means securing said ring in said frame or support.

5  
10  
15 5. In a sound box for talking machines, the combination of a diaphragm frame or support in the form of a metallic cup, a ring of elastic material seated in said cup and provided with an interior annular slit or groove, a diaphragm seated in said slit or groove, means securing said ring in position in said cup under compression, a stylus-bar formed of a single piece of forged metal pivotally mounted on said frame or support, and a spherical-faced nut on said stylus-bar and clamping said bar to the diaphragm between two flat surfaces, one of

which is engaged by the spherical face of said nut. 20

6. In a sound box for talking machines, a screw-threaded stylus-bar, a centrally perforated diaphragm through which said bar extends, two elements on said bar one on each side of the diaphragm and each having a flat face engaging said diaphragm, 25 and a clamping nut on said bar and having a spherical surface engaging one of said elements.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 30

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,  
JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





M. H. FISCHER.  
 STYLUS HOLDER FOR GRAPHOPHONES AND LIKE INSTRUMENTS.  
 APPLICATION FILED MAR. 13, 1911.

1,120,141.

Patented Dec. 8, 1914.

2 SHEETS—SHEET 1

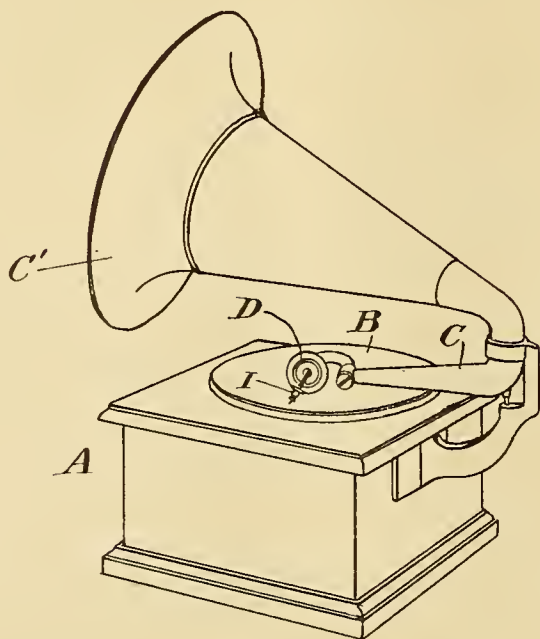


Fig. 1.

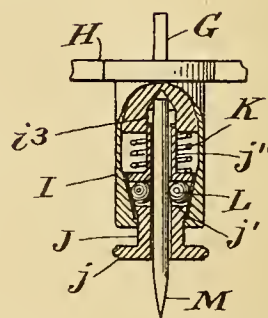


Fig. 5.

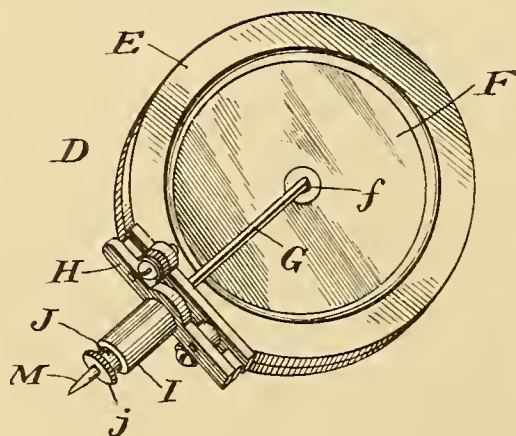


Fig. 2.

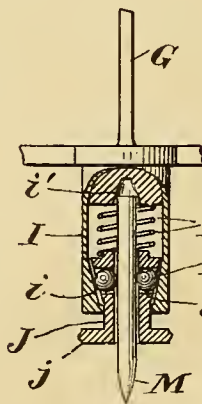


Fig. 3.

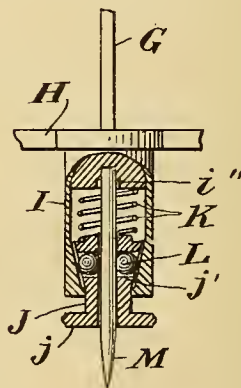


Fig. 4.

WITNESSES  
*Robert Head*  
*Walter D. Holmes*

INVENTOR  
*Maximilian H. Fischer*  
 BY  
*Joe F. O'Brien*  
 ATTORNEYS



M. H. FISCHER.  
 STYLUS HOLDER FOR GRAPHOPHONES AND LIKE INSTRUMENTS.  
 APPLICATION FILED MAR. 13, 1911.

1,120,141.

Patented Dec. 8, 1914.

2 SHEETS-SHEET 2.

Fig. 6.

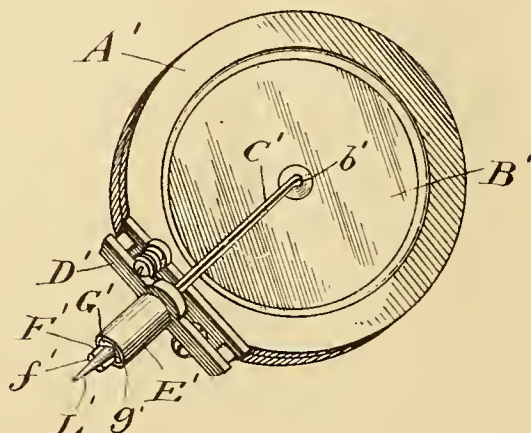


Fig. 7.

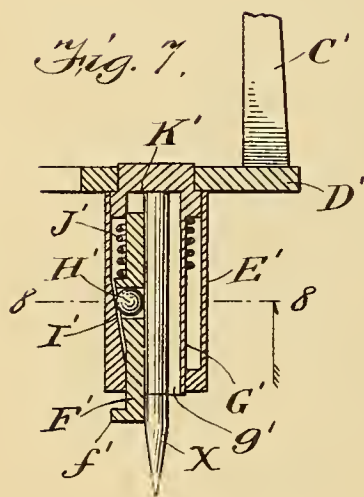


Fig. 8.

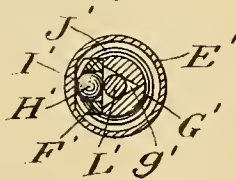
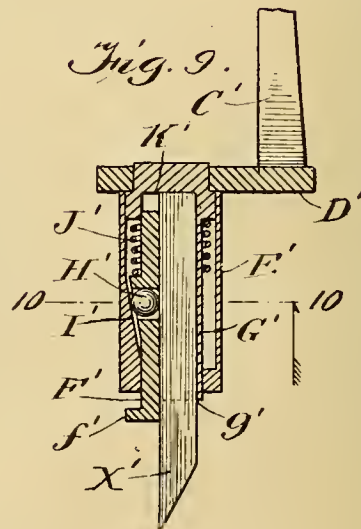


Fig. 10.



Fig. 9.



Witnesses:  
*Robert Head*  
*Nelson V. Holmes*

Inventor:  
*Maximilian H. Fischer*  
 By his Attorney,  
*Joe F. O'Brien*



# UNITED STATES PATENT OFFICE.

MAXIMILIAN H. FISCHER, OF EAST ORANGE, NEW JERSEY.

STYLUS-HOLDER FOR GRAPHOPHONES AND LIKE INSTRUMENTS.

1,120,141.

Specification of Letters Patent.

Patented Dec. 8, 1914.

Application filed March 13, 1911. Serial No. 613,960.

*To all whom it may concern:*

Be it known that I, MAXIMILIAN H. FISCHER, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Stylus-Holders for Graphophones and like Instruments, of which the following is a specification.

10 This invention relates to improvements in stylus holders for graphophones and like instruments.

By the use of my invention, the stylus of a graphophone or like instrument will be automatically gripped upon insertion into the holder, and when pressed home during the same operation will be held firmly and rigidly in place and furthermore may be readily, quickly and easily released and removed by a simple manipulation. In this way, the operation of the instrument is materially facilitated.

One of the greatest objections to the use of hard rubber records is the trouble, annoyance and time involved in adjusting, removing and readjusting the stylus in place after each record has been played. In devices of this kind, it is necessary that the stylus be held firmly and rigidly in position so as to communicate the full benefit of the vibrations caused by its travel over the indentations in the record to the reproducing diaphragm, and it is furthermore desirable that the stylus may be removed and replaced with great expedition.

By my invention I provide means for automatically gripping the stylus and means for retaining the same rigidly in position.

In the accompanying drawings, Figure 1 is an elevation of a phonograph; Fig. 2 is an enlarged view of the stylus holder and accompanying parts; Fig. 3 is a longitudinal section showing the stylus in place; Fig. 4 is a similar view of a modified form of my invention; Fig. 5 is a similar view of another modified form; Figs. 6 to 10, inclusive, illustrate a modified form of device adapted to grip styluses either circular or triangular in cross-section. In said figures, Fig. 6 is an elevation of a stylus holder and accompanying parts; Fig. 7 is a longitudinal section showing the same gripping a cylindrical stylus; Fig. 8 is a section on the line 8—8 of Fig. 2; Fig. 9 is a longitudinal section showing the device with a stylus of

triangular cross-section held in place; and Fig. 10 is a section on the line 10—10 of Fig. 9.

Referring now to Figs. 1 to 5 of the accompanying drawings, A designates phonograph box, B the disk, C the sounding funnel and C' the horn; D, the reproducing mechanism, comprising the drum E, diaphragm F, having the vibrating lever G, connected thereto at point *f*. H designates a bridge device which may be conveniently used in connection with my invention. I designates a cylindrical casing connected to the vibrating lever G through the bridge H. The casing I is provided with an interior inclined face *i* at what I shall term its front end and a tapering or conical hole *i'* which forms a seat for the rear end of the stylus. The tapering or conical seat *i'* will engage the rear ends of styluses of different thicknesses or varying diameters. The seat *i'* is preferably formed in a separate metallic piece and forced into the cylindrical casing I from the rear thereof. It will be understood that the casing I is made separately from the bridge H and lever G and subsequently secured thereto. A carrier J extends within the casing I and is provided with apertures *j'* in which apertures are seated gripping devices, such as the balls L, which impinge between an inclined portion *i* and the stylus M when the latter is inserted into the bore of the carrier. The carrier J is also preferably provided with an outwardly extending rim or flange *j* to enable the operator to manipulate the same to remove or replace the stylus. A spring K interposed between the rear end of the casing I and the carrier J, presses the carrier toward the lower or conical end of the casing and retains the gripping devices in normally operative or gripping position.

In Fig. 4, I have illustrated a modified form in all respects similar to Fig. 3, except that instead of the conical seat *i'*, which as aforesaid is adapted to receive styluses of a great many varying diameters, I have illustrated a seat *i''* adapted to receive styluses of only two different diameters, that is to say there are two concentric circular recesses, one within the other and the smaller one being the deeper of the two.

In Fig. 5 I have illustrated another modified form which is in all respects similar to Fig. 3 above described, except that the car-



rier J is provided with a rearward extension  $j''$  which extends rearwardly and slides backward and forward within a recessed seat  $i^3$  in the part containing the conical recessed seat for the stylus.

In Figs. 6 to 10, inclusive, I have shown another modified form of stylus holder embodying my invention, adapted to grip and retain styluses of either circular or triangular cross-section. Referring now to said Figs. 6 to 10, A' designates the drum, B' the diaphragm, C' the vibrating lever connected to the diaphragm at the point  $b'$  and D' designates the usual bridge piece. E' designates a cylindrical casing preferably provided with an inclined face I' at one side thereof. Fixed within the casing in any suitable manner is what I shall term a socket piece G' provided with a groove, or cut out portion  $g'$ , triangular in cross-section, extending longitudinally substantially throughout the entire length of the piece G'. The socket piece G' is provided with a rearward extension and connects the entire device to the bridge D'. A spring-pressed carrier F' carrying a gripping device such as the ball H' is movable longitudinally relative to the casing and to the said socket piece, and slides upon the edges of the triangular shaped groove or bore  $g'$ . The carrier F' is provided with an outward projection  $f'$  for the purpose of manipulation, and a spring J' abuts between the carrier and a portion of the socket piece G' which as aforesaid is fixed in relation to the casing. The spring J' of course normally forces the carrier outwardly toward the insertion opening and maintains the gripping device in

normal gripping position and in engagement with the inclined face of the casing. 40

The form of my invention illustrated in Figs. 6 to 10 inclusive, is especially effective in retaining styluses rigidly in place so as to procure the full benefit of its vibrations. By this construction the stylus is held rigidly 45 against the walls of the socket  $g'$  along its entire length.

In Figs. 7 and 8 I have illustrated a cylindrical stylus X held in place in my said device, and in Figs. 9 and 10 I have shown 50 a stylus X' triangular in cross-section so held.

Having described my invention, I claim:

A stylus holder for graphophones and like instruments, comprising a casing provided with an inclined face converging to its front end, a spring-pressed carrier movable longitudinally relatively to said casing and having a longitudinal bore for the insertion of the stylus, gripping devices carried by said carrier and moved transversely of the line of movement of the carrier by engagement with said inclined face to grip the stylus upon insertion into the bore of the carrier, means for preventing the stylus 55 from wobbling and means extending out of the casing for controlling the movement of the carrier to release the stylus. 60

In witness whereof, I have signed my name to the foregoing specification in the presence of two subscribing witnesses. 65 70

MAX. H. FISCHER.

Witnesses:

R. V. FINN,  
H. V. HOLMES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





G. F. NORRIS.  
SOUND REPRODUCING APPARATUS.  
APPLICATION FILED APR. 27, 1914.

1,120,841.

Patented Dec. 15, 1914.

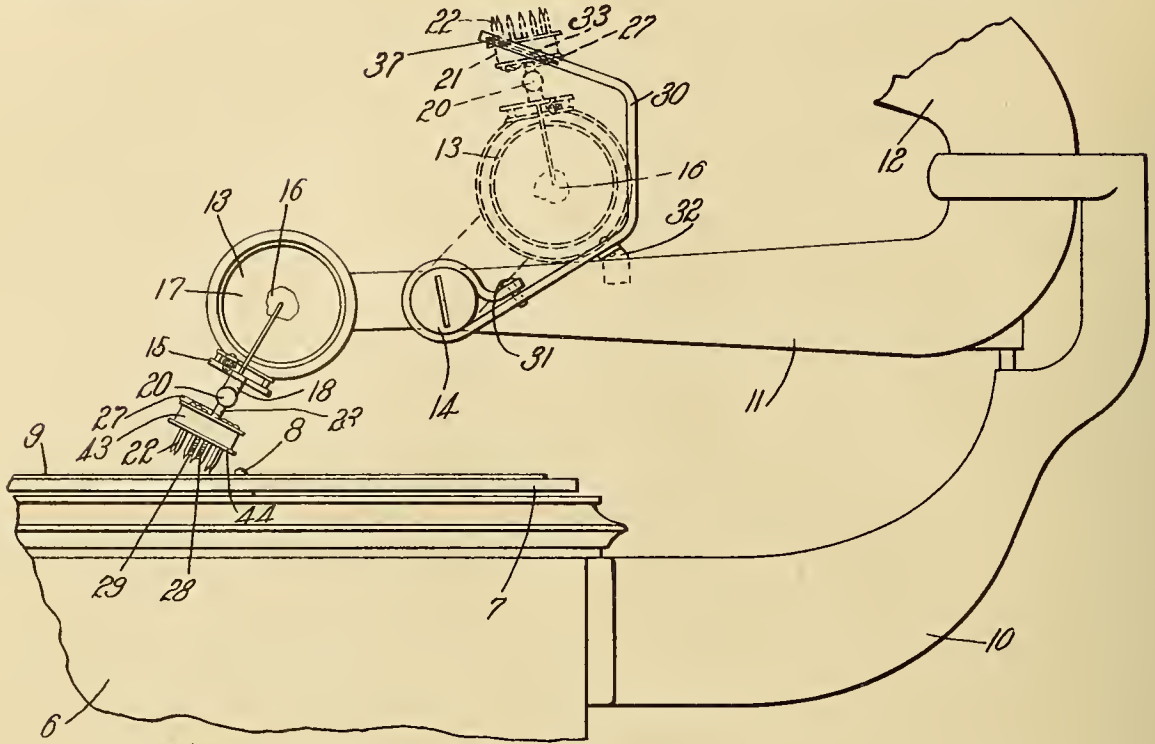


Fig. 1.

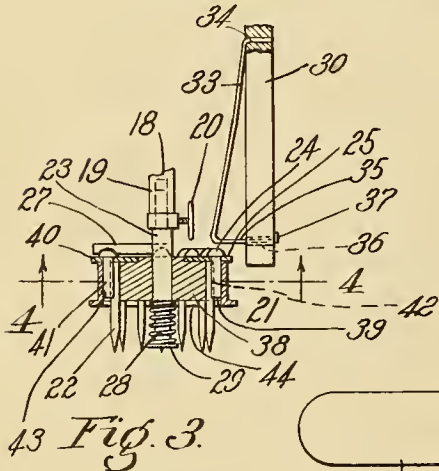


Fig. 3.

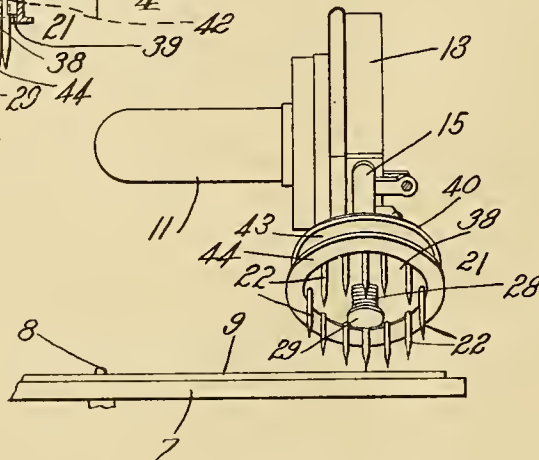


Fig. 2.

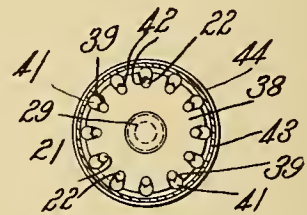


Fig. 4.

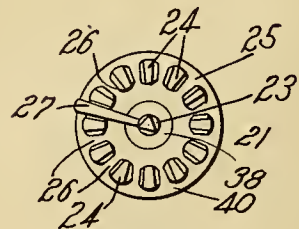


Fig. 5.

Witnesses:

Herman R. Hoffman

Lemuel A. Powell.

Inventor:

George F. Norris,  
by his attorney,  
Charles S. Gooding.

# UNITED STATES PATENT OFFICE.

GEORGE F. NORRIS, OF MALDEN, MASSACHUSETTS, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO ALEXANDER STEINERT, OF BOSTON, MASSACHUSETTS.

## SOUND-REPRODUCING APPARATUS.

1,120,841.

Specification of Letters Patent.

Patented Dec. 15, 1914.

Application filed April 27, 1914. Serial No. 834,626.

*To all whom it may concern:*

Be it known that I, GEORGE F. NORRIS, a citizen of the United States, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Sound-Reproducing Apparatus, of which the following is a specification.

This invention relates to improvements in sound reproducing apparatus otherwise known as talking machines in which a record is employed having a spiral or helical groove adapted to be followed or traced by an instrument commonly known in the art as a needle. The needles as used in this connection are constructed of a comparatively soft metal or fiber, in order that they may not injure or destroy the delicate surface of the records and by being soft the tracing of a single record usually suffices to wear them out or at least destroy their efficiency; consequently when it is desired to play a record the second time or to start on a new record a new needle must be supplied.

The object of the invention is to provide a device adapted to maintain a plurality of needles in readiness to be moved successively into an operative position relatively to the record of the machine thereby changing from a used to an unused needle each time a record is played until the supply has been exhausted, or if it is so desired said supply of needles may be successively presented to said record or other records placed on the machine and used the second time.

The object of the invention is further to provide a suitable holder for said needles which is capable of firmly holding said needles in their operative positions against the record, said holder being constructed to fit the usual needle socket provided in said sound box.

The invention consists in the combination and arrangement of parts whereby the above objects and certain other objects hereinafter appearing may be attained, as set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings: Figure 1 is a side elevation of a portion of a sound reproducing apparatus or talking machine embodying my invention, certain parts of said apparatus being broken away to save space in the drawings. Fig. 2 is a front elevation illustrating the sound box in its operative

position against the face of a record, portions of said record and the rotatable support therefor being broken away. Fig. 3 is a detail section, partly in elevation, of the needle holder and means for rotating said holder. Fig. 4 is a section, partly in elevation, taken on line 4—4 of Fig. 3. Fig. 5 is a rear elevation of the needle holder.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 6 is a casing adapted to contain the usual type of motor used in operating talking machines and which by reason of its being so well known to those skilled in the art is omitted from the drawings. A turn table 7, which in the present case is disk shaped, is mounted upon a spindle 8 which protrudes from the casing 6 and is operated by means of the motor within said casing to rotate said turn table. A record 9 in the present case of the type known as a disk record rests upon the turn table 7 and is revolved thereby, said record having a spirally arranged laterally undulated groove formed in its face.

A bracket 10 is secured to the side of the casing 6 and has pivotally mounted thereon a tone tube 11, the free end of which is adapted to swing transversely of the face of the record 9, said tube either leading to a horn 12, as shown in Fig. 1, or if desired to a sounding board not shown in the drawings. A sound box 13 is pivoted at 14 to the free end of said tone tube, said sound box having a pivoted arm 15 whose inner end is secured at 16 to the center of a diaphragm 17. The opposite end 18 of said pivoted arm is provided with a socket 19 adapted to contain needles of the various well-known types, said socket being preferably triangular in shape and having a thumb screw 20 arranged to secure needles in place therein. A needle holder 21 is secured to said sound box and adapted to be rotated relatively thereto, said holder being adapted to contain a plurality of needles 22 preferably uniformly spaced about the axis of said holder 21.

As hereinbefore stated the holder 21 is arranged to rotate relatively to the sound box 13 preferably about a stud 23 the upper end of which is triangularly formed and adapted to fit the socket 19 and to be held therein by the thumb screw 20. A plurality of projections 24 are provided on the rear



face 25 of the holder 21, said projections forming recesses 26 corresponding to the number of needles contained in said holder.

The stud 23 is provided with a lateral projection or pin 27 arranged to fit the recesses 26 and to be yieldingly held therein by a spring 28, which encircles the stud 23 bearing at one end against the collar 29 on said stud and at the opposite end against the end of the rotary member 21, the relative positions of said recesses 26 and the needles 22 being such that when said projection 27 is in one of said recesses one of said needles will be in contact with the disk 9, that is, when the sound box 13 is in its operative position, said projection preventing more than one needle from contacting with said record at one time.

During the operation of the apparatus the turn table 7 is rotated and in turn imparts a rotary motion to the record 9 during which time one of the needles, carried by the holder 21, is placed within the groove formed in the face of said record, whereupon the undulations of said groove will impart a rocking movement through said needle to the arm 15 which, in turn, vibrates the diaphragm 17, while at the same time said sound box is moving from the point near the periphery of said record toward the center thereof causing the tone tube 11 to be swung about its pivot. When the end of the groove in said record has been reached the sound box is swung upwardly about the pivot 14 into the position illustrated in dotted lines Fig. 1, with one edge of said sound box resting against the tone tube 11, while the needles 22 are elevated or moved clear of the record permitting said record to be removed and another record placed on the table, or the same record reversed as the case may be.

The swinging of the sound box as described is performed each time a record is put on or taken off, the full line position of the sound box in Fig. 1 illustrating the operative position thereof, while the dotted lines illustrate the inoperative position of said sound box. To accomplish the rotation of the holder the distance between two consecutive needles or to move a new needle into a position to engage the record 9, the needle holder 21 is rotated upon the stud 23 by hand, if desired, but preferably automatically during a predetermined pivotal movement of said sound box, or at least during the latter portion of the upward movement of said sound box, by means preferably consisting of an arm 30 secured to the tone tube 11, by a screw 31, a bracket 32 engaging said tone tube 11 and properly positioning said arm relatively to said tube.

The upper end of the arm 30 is provided with a spring 33 secured at 34 to said arm, while the opposite end 35 is bent trans-

versely of the body portion of said spring and extends through a hole 36, and again said spring is bent to form a stop 37. The body portion of the spring 32 is arranged at an angle to the arm 30 and is adapted to be moved toward said arm for a limited distance, the outward movement thereof being limited by the stop 37.

The position of the spring 33 is such that as said sound box is swung upon the pivot 14 from its operative to its inoperative position the portion 35 thereof will engage one of the projections 24 on the holder 21 and cause said holder to be moved longitudinally of the stud 23 until the projections upon opposite sides of the lateral projection 27 have been disengaged from said projection, whereupon a continued movement of said sound box will cause said holder to be rotated until the next recess is brought beneath the projection 27. The spring 28 at this time causes said holder 21 to return to its normal position, thus locking the same in the desired position.

Just as the projection 27 enters the next recess the spring 33 escapes from the projection, which it has engaged in rotating said holder, permitting said sound box to be moved into a position against the tone tube 11 without further rotating said holder. Upon the return movement of the sound box to its operative position said holder strikes the inclined body portion of said spring 33 and instead of being rotated thereby deflects said spring without affecting the position of the needles or said holder.

The capacity of the needle holder 21 may be varied as desired, in the present instance however twelve needles are shown which permit twelve consecutive operations when the needles are to be used once, or if it is desired to use the needles a second time the operation may continue until twenty-four or more records have been played after which the holder may be removed by turning the screw 20 and withdrawing the stud 23 from the socket 19, while another holder with a fresh supply of needles may be inserted or the needles in said holder removed and other needles placed therein in their stead.

It is essential that the needles be held firmly in the holder 21 in order to prevent any loss or absorption of the vibrations transmitted by the record. As a preferred means for securing the needles in the holder 21 a barrel 38 is provided, said barrel having a plurality of radially disposed recesses 39 arranged at uniform distances from the axis thereof, whose inner ends are adapted to receive the butts of the needles 22. A ring 40 is secured to the end of the barrel 38, said ring having mounted therein a plurality of pins 41 which register with the radial recesses 39, said pins being slotted at 42 longitudinally thereof and upon the side adjacent



the needles 22 and into which said needles are adapted to project.

A second ring 43 is adapted to encircle the pins 41 and force said pins into the recesses 39 firmly against the butts of the needles, said latter ring being provided with a flange 44 which facilitates the removal of said ring from said pins when it is desired to remove and replace the needles in said holder.

In the above description I have described the preferred embodiment of my invention for illustrative purposes and have disclosed and discussed in detail the construction and arrangement incidental to the particular application. It is however to be understood that the invention is not limited to the mere details or relative arrangement of parts, neither to the specific application herein shown, but that extensive variations or deviations from the illustrated forms of the invention may be made without departing from the spirit and scope of the same.

Having thus described my invention what I claim and desire by Letters Patent to secure is:

1. A sound reproducing apparatus having, in combination, a tone tube, a sound box pivotally mounted on said tone tube, a multiple needle holder secured to said sound box, means to position said holder on said sound box with one of said needles in an operative position, and means on said tone tube adapted to be engaged by said holder during a portion of the pivotal movement of said sound box in one direction adapted to move one needle out of and another needle into said operative position.

2. A sound reproducing apparatus having, in combination, a pivotally mounted sound box adapted to be swung from an operative to an inoperative position, a needle holder secured to said sound box, said holder adapted to contain a plurality of needles, means to position said holder with one of said needles in an operative position when said sound box is in its operative position, and means rendered operative by the movement of said sound box from one of said positions to the other adapted to move said needle holder to present another needle to said operative position.

3. A sound reproducing apparatus having, in combination, a pivoted sound box adapted to be swung from an operative into an inoperative position, a stud detachably secured to said sound box, a needle holder rotatably mounted on said stud, a plurality of needles arranged about the axis of said holder, means adapted to yieldingly retain said holder in nonrotatable relation to said stud, and means rendered operative by the swinging of said sound box from one of its positions to the other adapted to rotate said needle holder the distance between two consecutive needles.

4. A sound reproducing apparatus having, in combination, a tone tube, a sound box pivotally connected with said tone tube adapted to be swung thereon from an operative to an inoperative position, a needle holder secured to said sound box, said holder adapted to contain a plurality of needles, means to position said holder with one of said needles in an operative position, and an arm secured to said tone tube adapted to be engaged by said needle holder during the movement of said sound box from one of said positions to the other and to rotate said holder the distance between two consecutive needles.

5. A sound reproducing apparatus having, in combination, a tone tube, a sound box pivotally connected to said tone tube adapted to be swung thereon from an operative to an inoperative position, a needle holder secured to said sound box, said holder adapted to contain a plurality of needles, means to position said holder with one of said needles in an operative position, an arm secured to said tone tube, a spring on said arm, and means on said holder adapted to engage said spring during the movement of said sound box in one direction from one of said positions to the other and rotate said holder a distance equal to the distance between consecutive needles.

6. A sound reproducing apparatus having, in combination, a pivoted sound box, a needle holder arranged beneath and adapted to be rotated relatively to said sound box, said holder adapted to contain a plurality of needles disposed about the axis thereof, means to secure said needles in said holder, and means rendered operative by a predetermined pivotal movement of said sound box adapted to successively present the needles in said holder to the operative position thereof.

7. A sound reproducing apparatus having, in combination, a pivoted sound box adapted to be swung from an operative into an inoperative position, a stud detachably secured to said sound box, a needle holder rotatably mounted on said stud, a plurality of needles arranged about the axis of said holder, means adapted to retain said holder in nonrotatable relation to said stud, and means rendered operative by the swinging of said sound box from one of its positions to the other adapted to rotate said needle holder the distance between two consecutive needles.

8. A sound reproducing apparatus having, in combination, a pivotal sound box, a stud detachably secured to said sound box, a needle holder rotatably arranged on said stud adapted to contain a plurality of needles, a projection on said stud, means on said holder adapted to engage said projection to prevent rotation of said holder, a spring adapted to yieldingly retain said

holder in contact with said projection and means rendered operative by a pivotal movement of said sound box adapted to rotate said holder.

- 5 9. A sound reproducing apparatus having, in combination, a pivotal sound box, a stud detachably secured to said sound box, a holder rotatably mounted on said stud adapted to contain a plurality of needles, means  
10 to secure said needles in said holder, a projection on said stud, means on said holder adapted to engage said projection and prevent the rotation of said holder, a spring

adapted to retain said holder in contact with said projection and means rendered operative by a pivotal movement of said sound box to disconnect said holder from said projection and rotate said holder a predetermined amount on said stud. 15

In testimony whereof I have hereunto set  
my hand in presence of two subscribing witnesses. 20

GEORGE F. NORRIS.

Witnesses:

SYDNEY E. TAFT,  
MARGARET E. HORN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





W. H. SCHOONMAKER.  
ATTACHMENT FOR TALKING MACHINES.  
APPLICATION FILED FEB. 23 1912.

1,121,139.

Patented Dec. 15, 1914.

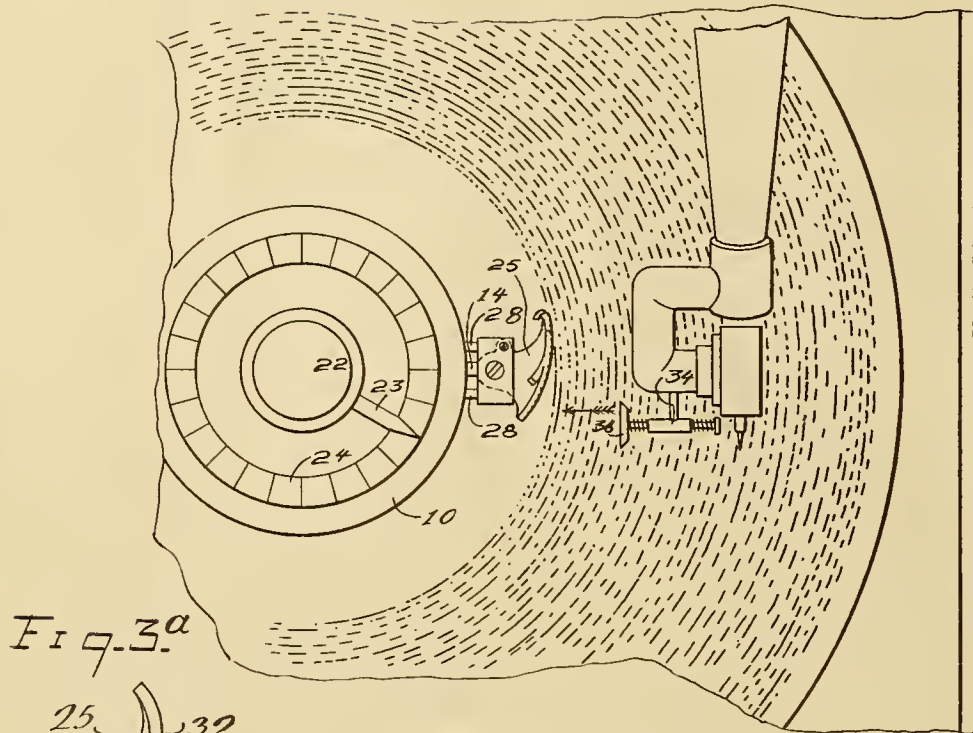


Fig. 3a

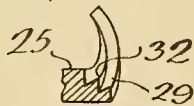


Fig. 1.

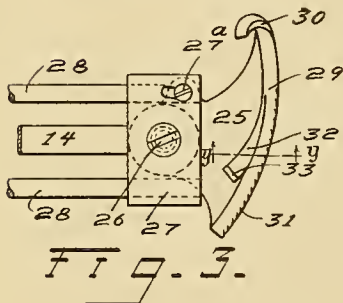


Fig. 3.

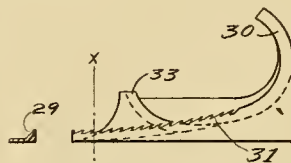


Fig. 5.

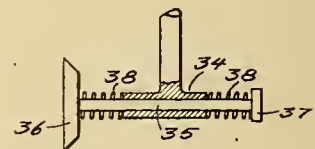
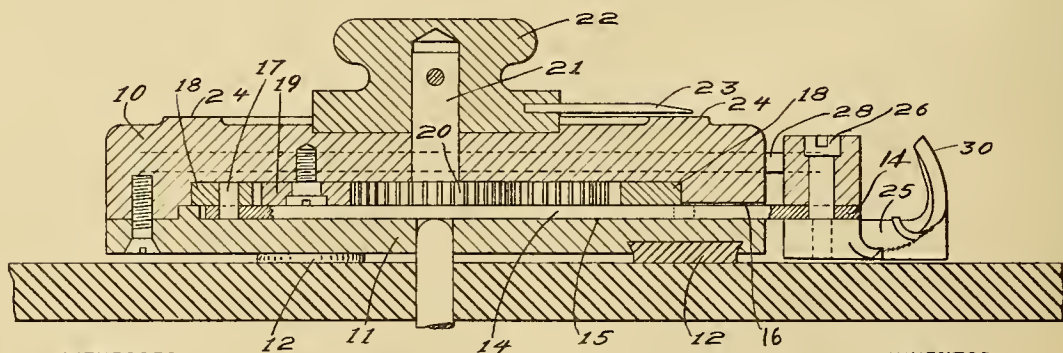


Fig. 4.



WITNESSES:

H. E. A. Kader

C. W. Fairbank

Fig. 2.

INVENTOR

William H. Schoonmaker

BY  
Jesse B. Owens  
his ATTORNEY

# UNITED STATES PATENT OFFICE.

WILLIAM H. SCHOONMAKER, OF MONTCLAIR, NEW JERSEY.

## ATTACHMENT FOR TALKING-MACHINES.

1,121,139.

Specification of Letters Patent.

Patented Dec. 15, 1914.

Application filed February 23, 1912. Serial No. 679,528.

*To all whom it may concern:*

Be it known that I, WILLIAM H. SCHOONMAKER, of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Attachments for Talking-Machines, of which the following is a full, clear, and exact description.

The object of my invention is to provide a device which will automatically lift the needle from the record of a phonograph or talking machine when the needle has reached the end of the record thus preventing the needle from bearing on the unlined portions of the record, plate or cylinder, to the injury of the machine, and the production of discordant and unpleasant sounds.

The invention is especially intended for use in connection with machines having disk records rotating in their own plane, though various of its principles are applicable to other types of machines as will hereinafter fully appear. In accomplishing this purpose, I provide a device which rests by its gravity on the record and turns with it, and which carries a trip fastened to engage a part on the sound box or reproducer when the end of the record has been reached, which trip thereupon lifts the sound box and with it, the needle, disengaging the latter from the disk or record and holding it disengaged. This allows the machine to be stopped and parts to be readjusted either to repeat the record or to place a new one in the machine.

My machine also involves a means of adjusting the trip to various positions suited to various records. This allows me to mark the records with an indicating number or other character, and then rapidly and easily to adjust the trip for the new record that is placed in position.

The invention involves various other features of importance, all of which will be fully set forth hereinafter and pointed out in the claims.

Reference is made to the accompanying drawings which represent as an example the preferred form of the invention.

Figure 1 is a plan view of the device, showing it in position on a disk record and illustrating the relative position of the sound box or transmitter. Fig. 2 is a central vertical section, showing the parts for effecting the adjusting of the trip. Fig. 3 is an enlarged plan view of the trip and its

connections. Fig. 3<sup>a</sup> shows a detail transverse section of a portion of the trip, taken on the line  $y-y$ , of Fig. 3. Fig. 4 is a detail of the attachment on the reproducer for co-action with the trip. Fig. 5 shows a side view of the trip 25.

The body (10) of the device is constructed preferably of metal and is sufficiently weighted to bear firmly on the disk record and turn with it. It may be removed and adjusted at will. It is furnished with a bottom plate (11) suitably fastened to the body and this plate is preferably provided with rubber pads or cushions (12) which set up a friction between the body of the device and the record, insuring that the body, does not accidentally lose its proper position on the record.

A bar (14) is located in a cavity (15) in the body of the device just above the plate (11) and this bar has one end arranged to slide through an orifice (16) in the body (10).

The outer end of the bar which carries the trip will be hereinafter fully described. This bar is pivoted at 17 to an internally toothed gear ring (18). The gear ring (18) is located in the cavity (15) and is arranged to move therein. It is clear that as this ring or annulus turns, it will move the bar 14 inward or outward, said bar sliding in and being guided by the opening 16. The annulus (18) is in mesh with an idler gear (19) and this in turn is in mesh with a pinion (20). The pinion (20) is carried on an arbor (21) which projects up through the body (10) and is fastened to a thumb wheel (22) mounted on the body. The thumb wheel carries an indicator point (23) which coacts with a scale (24) on the top of the body (10). Consequently, by turning the thumb wheel, the gears (20) and (19) are rotated and the annulus (18) is caused to move thus adjusting the distance that the bar (14) projects from the body of the device. This bar (14) carries the trip (25). The trip (25) is connected with the bar through a pivot (26) which projects from a block (27) fastened to two guide rods (28). The bar (14) is also attached to this pivot or pin (26) so that it may change its inclination to the guide rods (28), which it will do as the bar is moved in or out.

(27<sup>a</sup>) indicates a set screw or other device for fastening the trip at the desired angle and preventing its loose movement around



the pivot (26). By releasing this set screw, the trip may be adjusted and then held at the desired adjustment by tightening the screw. The guide rods (28) run in suitable passages formed in the body (10) of the device. This construction, as will be seen, permits the trip 25 to be moved radially in or out, as the case may be, by in or out movement of the bar 14 produced as above described; and since the bars 28 are so guided as to move rectilinearly, the trip also moves rectilinearly, notwithstanding the angular motion of bar 14. The screw 27<sup>a</sup>, and the slot in block 27 in which that screw works, permits the trip to be adjusted with respect to the bar 14.

The trip (25) is provided with a track (29) which is curved in approximately an arc similar to the curvature of the record lines on the disk. This track is at the true edge of the trip and inclines upward, terminating in a hook or stop (30) on the upper end of the track. The track is beveled or slanted downward toward its inner end and this true edge which is the high edge is formed with slight notches or kerfs (31), the purpose of which will hereinafter appear. The trip also comprises a return track (32). This starts at the upper end of the track (29) and sweeps toward its opposite end in approximate parallelism with the track (29) and terminates in a stop or up-turned end (33). The return track (32) is also beveled or inclined downward toward its inner edge.

Attached to the sound box or reproducer or the arm which carries the same in any convenient manner is a bearing (34) in which an axle (35) is loosely arranged. This axle carries at one end a beveled wheel (36) and at the other end a head (37). Two springs (38) are arranged on the ends of the axle. The result of this construction is that the wheel (36) is free to rotate and is also allowed an axial movement whereby any inequalities in the operation or adjustment of the various parts of the device are compensated for.

In the operation of the device it is placed in the center of the record and the thumb wheel (22) is turned to adjust the trip so that its track (29) is located at the point on the record where it is desired to stop the operation of the machine. By manipulation of the set screw (27<sup>a</sup>) the trip should be adjusted so that its track (29) inclines at a very acute angle with the record lines on the disk. The operation of the machine is now started and goes on in the usual way, the reproducer, carrying the wheel 36, being moved inward gradually in the well known manner, until said wheel touches the trip 25; whereupon the sharp edge of the wheel will engage in one of the notches or scores 31 of said trip, and said wheel then mounts the

track 29 of the trip, much as the wheels of a railroad car sometimes mount a track rail, and the wheel rolls along the track 29 until it is arrested by the upcurved end or stop 30 of said track. The rise of the wheel 36 as it mounts the track 29 lifts the reproducer with its arm, needle and other attachments clear of the record and not only stops the reproduction of sound but prevents damage either to the arm or needle. The inclination or taper of the track (29) as well as the form and arrangement of the notches (31) should be so gaged that the reproducer is not permitted to have a return or downward movement which might reengage the needle with the record. In other words, these parts should be so shaped that the needle once clear of the record will be held up in that position. The beveled track and the correspondingly beveled wheel (36) insures that the engagement once effected is retained, and that there be no danger of these parts slipping out of engagement and allowing the reproducer to fall back with its needle on the record. If there is any oscillation relatively between the trip and the wheel (36), and the wheel after reaching the stop (30) falls back down the track (29), the wheel will then run off on the return track (32) which acts as a sort of switch. In this manner, the wheel is confined between the stops (30) and (33) and cannot be accidentally dislodged. Of course, the reproducer may be lifted off the trip for a renewed operation of the machine.

It is, of course, to be understood that while I consider the construction here illustrated and described as preferable I am not, however, limited to the precise details shown and may vary the construction in numerous respects so long as the principles are retained.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. An attachment for sound reproducing machines comprising a member adapted for mounting on the record-carrier and provided with a track inclined upward in approximately the direction of normal travel of the sound reproducing point along the record, and thereby adapted for raising the sound-reproducing point from the record, in combination with a member, other than the sound reproducing point of the machine, adapted for mounting on the sound reproducer, and arranged to engage said track at a suitable point in the operation of the machine, and to ride along said inclined track and thereby to raise the reproducing point from the record, the said member adapted for mounting on the record carrier being provided also with a return track which the said member adapted for mounting on the sound reproducer will travel over



during its return movement, whereby the reproducing point is prevented from striking the record during such return movement.

5 2. An attachment for sound reproducing machines comprising a member adapted for mounting on the record-carrier and provided with a track inclined upward in approximately the direction of normal travel  
10 of the sound reproducing point along the record, and thereby adapted for raising the sound-reproducing point from the record, in combination with a member, other than the sound reproducing point of the machine,  
15 adapted for mounting on the sound reproducer, and arranged to engage said track at a suitable point in the operation of the machine, and to ride along said inclined track and thereby to raise the reproducing  
20 point from the record, said inclined track having, in addition to its before-mentioned inclination, a lateral inclination the said member adapted for mounting on the sound reproducer having a corresponding lateral  
25 inclination.

3. An attachment for sound reproducing machines comprising a member adapted for mounting on the record-carrier and provided with a track inclined upward in approximately the direction of normal travel  
30 of the sound reproducing point along the record, and thereby adapted for raising the sound-reproducing point from the record, in combination with a member, other than the sound reproducing point of the machine,  
35 adapted for mounting on the sound reproducer, and arranged to engage said track at a suitable point in the operation of the machine, and to ride along said inclined  
40 track and thereby to raise the reproducing point from the record, said inclined track having, in addition to its before-mentioned inclination, a lateral inclination, the said member adapted for mounting on the sound  
45 reproducer having a corresponding lateral inclination and having a yielding support permitting motion of said member both toward and from the support.

4. A phonograph attachment comprising  
50 a trip furnished with an upwardly inclined track, the upper end of which terminates in a stop and a return track or switch extending from the high end of the track backward toward the low end and also terminating in a stop and a part adapted to have  
55 connection with the reproducer and to be engaged by said tracks for the purpose specified.

5. An attachment for sound reproducing  
60 machines comprising a member adapted for mounting on the record carrier of the machine, and comprising a body portion, a

member movable in and out with respect to said body portion, and a track carried by said movable member and inclined upward  
65 in approximately the direction of normal travel of the sound reproducing point over the record, said track being angularly adjustable with respect to the said movable member.

6. An attachment for sound reproducing machines comprising a member adapted for mounting on the record carrier of the machine, and comprising a body portion, a member movable in and out with respect to  
75 said body portion, and a track carried by said movable member and inclined upward in approximately the direction of normal travel of the sound reproducing point over the record, said track having also a return  
80 track inclined upward in the direction opposite that of normal movement of the reproducing point over the record.

7. An attachment for sound reproducing machines comprising a member adapted for  
85 mounting on the record carrier of the machine, and comprising a body portion, a member movable in and out with respect to said body portion, and a track carried by said movable member and inclined upward  
90 in approximately the direction of normal travel of the sound reproducing point over the record, gear mechanism carried by said body portion for moving said movable member in and out, and a pointer and scale, one  
95 of which is carried by a movable portion of such gear mechanism, whereby the degree of projection of said movable member is indicated.

8. A phonograph attachment comprising  
100 a body, a bar arranged to move in and out thereof, an annulus in the body and pivotally connected to the bar to move the latter in and out, said annulus being toothed, a gear meshed with the teeth of the annulus,  
105 means for operating said gear, and a trip carried by the bar.

9. An attachment for sound reproducing machines comprising a body portion, a bar mounted in a lateral guide-orifice of said  
110 body portion, to move in and out with respect to said body portion, mechanism for so moving said bar in and out, a block pivoted to said bar, guide means for said block, independent of the said bar, and tripping  
115 means carried by said block.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. SCHOONMAKER.

Witnesses:

ELEANOR T. MINOGUE,  
C. W. FAIRBANK.



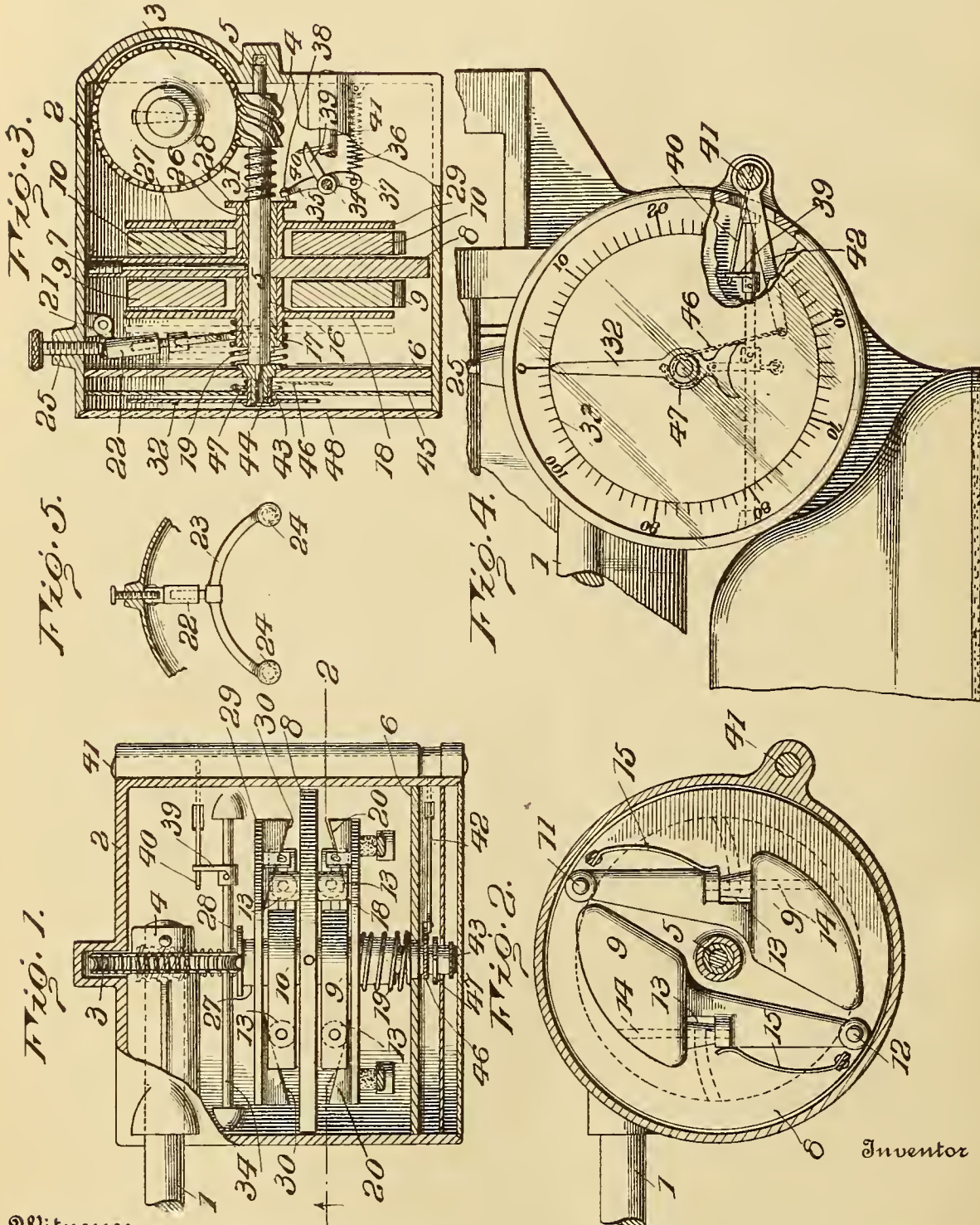
SPEED GOVERNOR FOR TALKING MACHINES,  
# 1,121,887-----Clinton E. Woods,  
Patented-DEC. 22, 1914.  
Filed-February 4, 1914.



C. E. WOODS.  
SPEED GOVERNOR FOR TALKING MACHINES.  
APPLICATION FILED FEB. 4, 1914.

1,121,887.

Patented Dec. 22, 1914.



Witnesses  
Jas. H. Anderson.  
R. C. Fitzhugh.

Clinton E. Woods.  
By  
Lawrence Cameron, Lewis & Cassie  
Attorneys



# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SPEED-GOVERNOR FOR TALKING-MACHINES.

1,121,887.

Specification of Letters Patent.

Patented Dec. 22, 1914.

Application filed February 4, 1914. Serial No. 816,569.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Speed-Governors for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to speed governors, and more particularly to speed governors for governing and indicating the speed of motors for talking machines.

The object of the invention is to provide a simple and efficient device of this character, which shall be efficient in governing or controlling the speed of the talking machine motor, and accurate in indicating the speed or number of revolutions per minute which the motor is imparting to the record tablet of the talking machine.

With this object in view, the invention consists in the combination of elements hereinafter more particularly described and pointed out in the claims.

The inventive idea may be expressed in a variety of forms, one of which is shown in the accompanying drawings, for the purpose of illustrating the invention, but not for the purpose of defining the limits of the invention, reference being had to the claims for this purpose.

In said drawings Figure 1 is a top plan view of the mechanism, with the inclosing casing thereof partly in section and partly broken away; Fig. 2 is a section on the line 2—2 of Fig. 1, looking in the direction of the arrow; Fig. 3 is a side elevation, with the inclosing casing and some of the parts shown in central section; Fig. 4 is a front face view, partly broken away; and Fig. 5 is a detail of the friction pad yoke and connected parts.

Referring to the drawings, in which like reference numerals indicate corresponding parts throughout the several views, 1 is a shaft operatively connected to the motor of the talking machine, and with one end taking bearing in the walls of the casing 2, suitably mounted upon the talking machine. This shaft 1 has on the end thereof, and within the casing 2, a worm gear 3 meshing with a worm 4 formed on the governor shaft 5, which has bearing at one end in the wall of the casing, and at the other end in a vertical

partition 6, as will be clearly seen by an inspection of Fig. 3. Keyed to the governor shaft 5, by a set screw 7, is a disk 8, to which there are pivoted two pairs of weights 9, 9, and 10, 10, one member of each pair of weights being pivoted on a pivot 11 passing through the disk 8, and one member of each pair of weights being pivoted on a pivot 12 also passing through the disk 8, as is shown in dotted lines in Fig. 1. The four weights 9, 9, and 10, 10, are all alike in construction, and therefore a description of one will suffice for all four. These weights are preferably shaped as shown in Fig. 2, and have an anti-frictional roller 13 pivoted in a cut-away space therein on a pivot 14, which is indicated in dotted lines in Fig. 2. The weights are held in their innermost position, close to the shaft 5, by springs 15, 15, and when the shaft 5 is revolved by the action of the motor, the weights, under the influence of centrifugal force, move outward toward the periphery of the disk 8.

Mounted to slide on a bushing 16 secured to the shaft 5 on the forward side of the disk 8, is a sleeve 17, which sleeve carries a circular flange or disk 18, and a spring 19 is interposed between said flange or disk 18 and the partition 6. On the disk 18 are two cam surfaces 20, 20, the lowest points of which cam surfaces are opposite the anti-frictional rollers 13 on the weights when the machine is not in motion, and the weights occupy the position shown in Fig. 2. When, however, the weights are thrown outward under the influence of centrifugal force, the anti-frictional rollers 13, acting on the cam surface 20, 20, force the disk 18 away from the disk 8, that is, from the full line to the dotted line position in Fig. 3, this movement of the disk 18 being against the tension of the spring 19. Pivoted to a depending lug 21 on the interior wall of the casing 2, is a bell-crank lever 22, having a fork or yoke 23 (Fig. 5) pivoted therein, so as to turn around a vertical axis, said yoke having the friction pads 24 thereon, which pads are carried in front of the disk 18. A micrometer screw 25 is screw-threaded into the walls of the casing 2, and bears on the angular lever 22 at its angular point to adjust it around its pivot, whereby the pads 24, 24, are brought closer to, or per-



mitted to recede more or less from, the disk 18.

To the rear of the disk 8 (that is, on the opposite side thereof from the disk 18) is a bushing 26, on which is slidably mounted a sleeve 27, preferably provided with a flange 28. This sleeve 27 is also provided with a circular flange or disk 29, similar to the disk 18, and the disk 29 is provided with cam surfaces 30, 30, corresponding to the cam surfaces 20, 20, on the disk 18, which cam surfaces are opposite the anti-frictional rollers 13 on the weights 10, and when the shaft 5 is revolved by the motor the weights 10, 10, move outward, under the influence of centrifugal force, and the rollers 13, 13, acting on the cam surfaces 30, 30, force the disk 29, and with it the sleeve 27 and the flange 28, from left to right in Fig. 3, against the tension of a spring 31 reacting between the sleeve 27 and the end of the worm 4 on the shaft 5. This movement of the sleeve 27 is employed to actuate an indicator or pointer 32 (Fig. 4), which acts, in conjunction with a scale 33, to indicate the speed at which the motor is moving.

The connection between the moving sleeve 27 and the pointer 32 is secured as follows: Keyed to a shaft 34 is a lever arm 35 (Fig. 3), which is held in operative engagement with the flange 28 by a spring 36 engaging the lower arm 37 of the lever arm 35. The end of the lever arm 35 may bear directly against the flange 28, if desired, but preferably I place an adjusting screw 38 through the end of the lever, as shown in Fig. 3, permitting the inner end of the screw to bear against the flange. This is for the purpose of accurately adjusting the device, to the end that the pointer 32 may be made to exactly indicate the number of revolutions per unit of time imparted to the record tablet.

Keyed to the shaft 34 is a lever arm 39, which normally rests above a lever arm 40 keyed to a shaft 41 extending from front to rear of the casing 2, and having bearing in the walls thereof. The shaft 41 has secured to its forward end, and at a point in front of the partition 6, a lever arm 42 (see Figs. 1 and 4), and the pointer 32 is keyed to a hollow drum or hub 43, mounted to turn on a hollow projection 44 supported in the partition 6 and the dial face 45, which hollow projection, as here shown, also forms the bearing for the forward end of the shaft 5. A cord or band 46 (Fig. 4) is secured at one end to the end of the lever arm 42 on the shaft 41, and the other end of the cord is wound around the drum 43 and secured thereto, as shown in Figs. 3 and 4. A light spring 47, shown in dotted lines in Fig. 4, is also secured to the hollow drum or hub 43 at one end, and has the other end secured to the partition 6. The

index scale 33 may, if desired, be covered with a glass or other transparent front 48, though this may be omitted.

The parts are so adjusted and arranged that when the machine is standing still, the pointer 32 rests opposite the zero point on the scale 33, with the cord 46 wound around the drum 43.

Operation: When the motor is in motion, revolution is imparted to the shaft 5 through the worm gear 3 and the worm 4, causing the weights 9, 9, to fly out, under the influence of centrifugal force, thus moving the disk 18 from the full to the dotted line position of Fig. 3, where it is brought in contact with the friction pads 24, 24, whose position is adjusted by the micrometer screw 25 to regulate the amount of friction between the disk 18 and the pads 24, and thereby govern the speed of the motor. At the same time, but independently of the centrifugal weights 9, 9, the weights 10, 10, are thrown outward by centrifugal force, shifting the disk 29 from left to right (Fig. 3), thereby rocking the shaft 34, through the lever arm 35, and causing the arm 39 on said shaft to depress the lever arm 40 on the shaft 41, and thereby rock said last-named shaft. This rocking action serves to depress the arm 42 on said shaft, and unwind the cord 46 from the drum 43, revolving said drum, and with it the pointer 32, against the tension of the light spring 47, which spring serves, when the motor is brought to rest, or the speed of the motor is lessened, to move the index pointer 32 to or toward the zero point.

It will be observed that, while the action of the disks 18 and 29 is each dependent upon the speed of the shaft 5, nevertheless these two disks perform their functions each independently of the other. This is important, since it has been found that inaccuracies occur in the indicating pointer if it is moved through the action of the same disk that is under the control of the friction pads 24.

While I have thus far described the mechanism with some particularity, in order that the same might be thoroughly understood, the invention is not limited to the specific details of construction as set forth, since these may be varied within limits, without departing from the spirit of the invention, which is defined in the appended claims.

What is claimed is:—

1. In a device of the character described, the combination of a motor-driven shaft, an element secured to and revolving with said shaft, two pairs of centrifugally operated weights pivoted to said element one pair on each side thereof, two disks slidably mounted on said shaft to revolve therewith and on opposite sides of said element, cam surfaces on said disks in operative engage-



ment with said weights, a braking device in operative relation with one of said disks, and an indicating device in operative relation with the other disk.

5 2. In a device of the character described, the combination of a motor-driven shaft, a disk secured to said shaft and revolving therewith in a plane at right angles to the axis of the shaft, a pair of weights pivoted  
10 on the opposite faces of said disk near its periphery, cams slidably mounted on said shaft on opposite sides of said disk and in operative relation with said weights, a braking device in operative relation with the  
15 cams on one side of said disk, and an indicating device in operative relation with the cams on the other side of said disk.

3. In a device of the character described, the combination of a motor-driven shaft, a  
20 disk secured thereto and revolving therewith in a plane at right angles to the axis thereof, a pair of weights pivoted to one side of said disk near its periphery, and another pair of weights similarly pivoted to the other side  
25 thereof, a brake, an indicating device, operative connections between one pair of weights and said brake, and operative connections between the other pair of weights and said indicating device.

30 4. In a device of the character described, the combination of a casing, a motor-driven shaft mounted in said casing, an indicating pointer and dial in front of said casing, a

disk lying in a plane at right angles to the axis of said shaft and keyed thereto, cen- 35 trifugally operated weights pivoted to the front side of said disk, brake mechanism operated by said weights, means for adjusting said brake mechanism, a second pair of centrifugally operated weights pivoted to 40 the rear side of said disk near its periphery, and operative connections between said second pair of weights and said pointer.

5. In a device of the character described, the combination of a casing having a parti- 45 tion wall, a motor-driven shaft having bearing in said partition wall and in an end wall of the casing, an indicating pointer and dial in front of said partition wall, a disk secured to said shaft in a plane at right angles 50 to the axis thereof, with four weights similar in size and weight pivoted to said disk near its periphery two on either side thereof, a brake mechanism, operative connections between said brake mechanism and the 55 pair of weights on the front side of said disk, and operative connections between said pointer and the pair of weights on the rear side of said disk.

In testimony whereof I have signed this 60 specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

J. S. GRIFFITH,  
JOHN R. PETRIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



1,122,679  
Borzsony.

*File*  

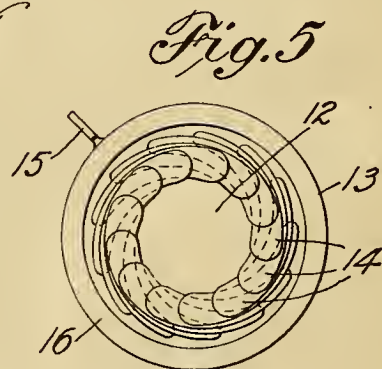
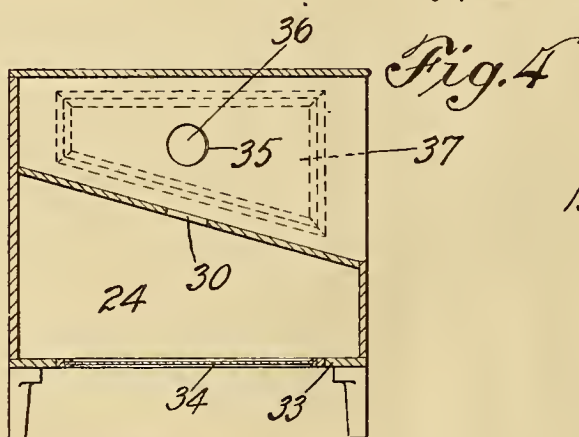
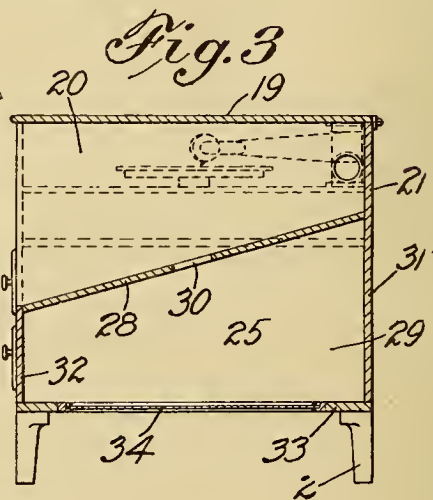
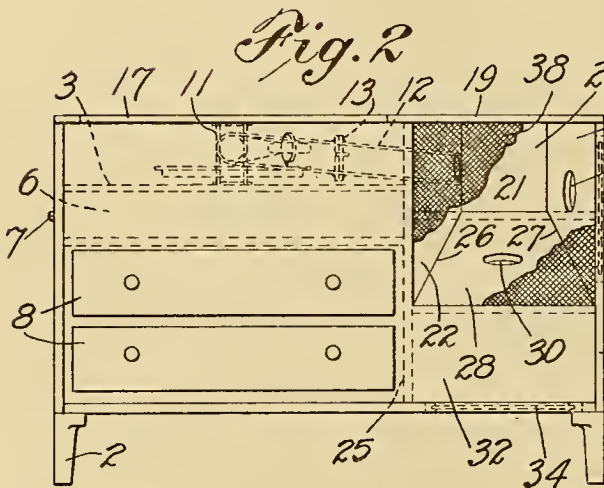
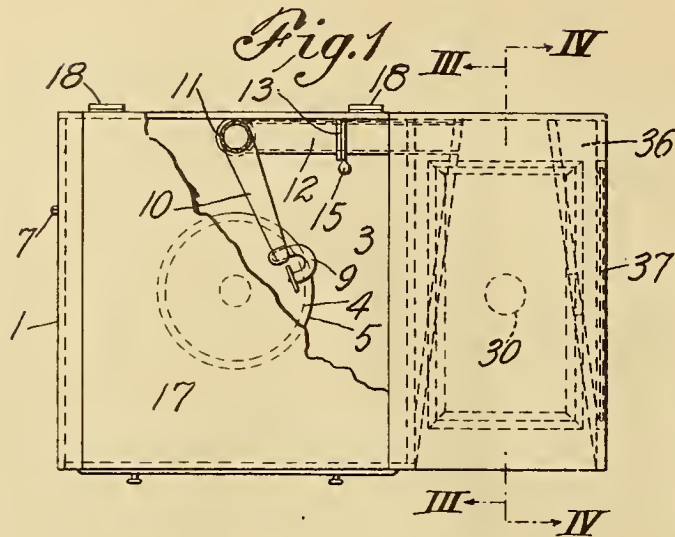
---



A. BÖRZSÖNY.  
TALKING MACHINE CABINET.  
APPLICATION FILED JULY 19, 1910.

1,122,679.

Patented Dec. 29, 1914.



*Witnesses*  
*Frank H. Vick*  
*W. F. Allen*

*Inventor*  
*Armin Börzsöny*  
*by Howard K. [Signature]*

# UNITED STATES PATENT OFFICE.

ARMIN BÖRZSÖNY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO  
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE CABINET.

1,122,679.

Specification of Letters Patent.

Patented Dec. 29, 1914.

Application filed July 19, 1910. Serial No. 572,662.

*To all whom it may concern:*

Be it known that I, ARMIN BÖRZSÖNY, a subject of the King of Hungary, and a resident of the borough of Manhattan, county, city, and State of New York, have invented certain new and useful Talking-Machine Cabinets, set forth in the following specification.

This invention relates to an improvement in cabinets for sound reproducing machines commonly known as talking machines.

An object of the invention is to improve the quality of the tones reproduced by the machine and to provide for the ready regulation of the loudness of a reproduction.

Further objects are to simplify and cheapen the construction of a cabinet containing the sound reproducing mechanism and sound amplifying and discharging mechanism.

To the above ends a sound amplifier is combined with the cabinet and with one or more resonating chambers so arranged as to affect the quality of the tones emanating from the sound reproducing mechanism.

The above and further objects of the invention will be pointed out more particularly in the following claims which should be read in connection with the accompanying drawings which form a part of this application, which are particularly referred to in the following specification, and in which,—

Figure 1 is a plan view of the cabinet showing contained parts part of cover being broken away; Fig. 2 is a front elevation of the structure shown in Fig. 1 with a part of the protecting screen for the horn broken away; Fig. 3 is a vertical section through line III—III of Fig. 1 looking in the direction of the arrows; Fig. 4 is a vertical section through line IV—IV of Fig. 1, which corresponds with line III—III, and looking in the direction of the arrows; and Fig. 5 is a detail view of the iris regulating valve for the sound conduit.

Referring now more in detail to the drawings, 1 indicates a cabinet of any approved construction which may be supported by suitable feet 2; a horizontal part 3 is provided, which is superposed by the usual rotatable table 4 for carrying a reproduction disk 5. The usual spring driving mechanism for the table 4 is located beneath the part 3 in a suitable compartment 6, shown

in dotted lines. The driving mechanism in the drawings is indicated by the winding shaft 7 projecting laterally through the end wall of the cabinet. Beneath the compartment 6 may be located drawers 8 for containing additional disk records.

9 indicates the sound box of any suitable construction connected in a suitable manner with the swiveled tubular arm 10 which is mounted to swing horizontally on the upright tube 11 mounted on the horizontal partition 3. Extending laterally from and forming a continuing duct from the upright 11 is the sound conduit 12. This conduit 12 may be provided as shown with a choke valve 13. This valve is the well known iris shutter commonly used in photography. Its essential elements are illustrated in detail in Fig. 5 and comprise a series of pivoted plates 14 arranged overlapping each other and so mounted that they may be caused to swing individually toward the center of the duct 12 thereby more or less choking the passage therethrough. The finger lip 15 is provided to rotate the ring 16 having suitable engagement with the plates 14 so as to cause their movement inwardly or outwardly to regulate the size of the sound opening through the duct 12.

Choke valves, as heretofore employed in sound ducts for restricting the volume of sound passing therethrough, have consisted usually of flaps, single sliding diaphragms or similar devices which have operated to direct the volume of sound more or less directly against the sides of the conduit. Some of such devices operate in such manner that the more the passage is restricted the more directly are the sound waves brought into contact with the walls of the conduit. The iris valve, of the general design illustrated, by reason of its maintenance of the center of the sound opening continually in the axial center of the conduit, entirely avoids this objection and has been found to produce a more pleasing modification of the passing sounds.

A cover 17 may be hinged to the cabinet 1 as by hinges 18 so as to give access to the table 4 and sound box 9, the reproduced sound from which is conducted through the sound-conduit 12 into the rear or small end of the sound amplifier or horn 20 presently to be described. That portion of the cabinet at one side of the sound reproducing mecha-



nism is a rectangular boxlike structure fitted with a sound amplifier or horn comprising a wooden structure of frusto-pyramidal shape. In the present construction the top wall 19 of this horn 20 is horizontal and forms also the top partition of the cabinet 1 at this locality. The rear wall 21 of this horn is formed by the rear wall of the cabinet and is vertical as shown. The left hand side wall 22 extends rearwardly from the front of the cabinet diagonally to the right but is arranged in a vertical plane. The right hand side wall 23 is arranged symmetrically to the wall 22, likewise in a vertical plane. Thus, at the front, the lateral opening at the mouth of the horn 20 corresponds in extent with the lateral distance between the right hand outer partition 24 of the cabinet 1 and the vertical partition 25 extending from front to rear of the cabinet to complete the boxlike structure, while the lateral space between the side walls 22 and 23 at the rear of the horn 20 is much less due to the inward convergence of the side walls 22 and 23. The lower edges 26 and 27 of the side walls 22 and 23 are upwardly beveled from the front to the rear, as indicated, and are suitably joined to the upper face of a rearwardly and upwardly inclined lower partition wall 28 which extends completely across the space between the vertical partitions 24 and 25. The portion of this wall 28, demarked by the side walls 22 and 23 of the horn, forms the lower wall of the horn 20 while, at the same time, this partition wall 28 forms the upper partition for a resonating chamber 29 of frusto-wedge shape. This chamber 29 is open to the interior of the horn 20 through the sound-perforation 30 formed in the wall 28. The chamber 29 is closed at the rear by the portion 31 of the rear partition wall of cabinet 1 and at the front by the front partition wall 32 and at the bottom by the bottom closure or wall 33 of the cabinet 1. This bottom wall of the cabinet 1 is provided with a resilient especially prepared sounding board panel 34.

In the preferred construction, the vertical extent of the resonating chamber 29 at the rear is twice its vertical extent in the front. This is indicated in the drawings. Conversely the vertical extent of the opening in the horn 20 is twice as great at the mouth of the horn as it is at the rear.

An additional resonating chamber is provided at the right of the right hand side wall 23 of the horn. This has communication with the interior of the horn through the opening 35. This second resonating chamber 36 is bounded by the cabinet partition wall 24; the top wall 19; the right hand side wall 23 of the horn and the inclined wall 28; and is tapering wedge shaped. In Fig. 4 there is indicated in dotted lines a sounding board panel 37 mounted in the cabinet wall

24 for the resonating chamber 36 similar to 34, described.

It should be noted that the wall 28 divides a relatively large chamber into a pair of smaller substantially equally sized compartments one arranged above the other and being entirely uncommunicating except through the specially arranged aperture 30 in the dividing wall. The space or compartment above the wall 28 serves as a resonating chamber for modifying and improving the tones emanating from the amplifier, the sound waves within said resonating chamber themselves being amplified by contact with the sounding board 34 in the bottom thereof, and being projected by said sounding board through the opening 30 for intermingling with and modifying the waves in the upper compartment. The upper compartment is further divided by the vertical walls 22 and 23 at least one of which, as 23, is formed with an aperture 35 similar to the aperture 30 for communication with the otherwise closed space between said wall and the outer wall of the cabinet. The sounding board 37, in the outer cabinet wall, is for the same purpose and is disposed so as to bear the same relation to the aperture 35, that the sounding board 34 bears to the aperture 30, and the projecting of sound waves by the board 37 through the aperture 30 not only causes said waves to mingle with the normal waves in the amplifier, but also with the waves injected therein through the aperture 30 in such manner as to form a crossing and a mingling of sound waves, so that as they finally emanate from the large open end of the amplifier or upper compartment they are devoid of the ringing harshness usually present in sound given off by machines of this class. The positions of the apertures 30 and 35, substantially centrally above the respective sounding boards, together with the relative sizes and shapes of the openings, are so calculated as to best accomplish the sought-for results.

The mouth of the horn 20 may be permanently covered by a screen 38 fixed in position to the edges of the horn and serving to prevent the ingress of foreign objects.

During the reproduction of sound by the reproducer or sound-box 9 the sound is conducted by the sound conduit 12 into the rear of the horn or amplifier 20, by means of which, according to the principles of resonance, the magnitude of the sound is amplified and thrown out into the room from the mouth of the horn. It has been found that the combination of one or more resonating chambers such as 29 and 36 having communication with the interior of the horn results in a pleasing modification of the sounds reproduced. It is believed that individual columns of air vibrate vertically within the resonating chambers 29 and are



individually of varying lengths according to their position either forward or back within the said chamber and that the vibration of these columns of air is communicated into the interior of the horn 20 through the opening 30, so as to modify, in a pleasing manner, the final sound emanating from the structure. It has been found that the volume of the reproduced sound may be modified in an effective manner by means of a throttling valve indicated in the Figs. 1 and 2 and specifically in Fig. 5, even though this valve is located entirely apart from the sound amplifier or horn 20.

Although a preferred embodiment of the invention has been illustrated and described it is to be understood that the same is merely illustrative of the invention, while

What is claimed and what is desired to be secured by United States Letters Patent is set forth in the following claims.

1. In a cabinet for sound reproducing machines, a chamber having an apertured partition wall dividing said chamber into upper and lower compartments, one of said compartments comprising the amplifier of said machine, and the other of said compartments being provided with a sounding board in one of its walls, and the aperture in said partition wall being substantially centrally disposed relatively to the resonant surface of said sounding board so as to facilitate projection of sound waves through said aperture.

2. In a cabinet for sound reproducing machines, a chamber having an apertured partition wall dividing said chamber into upper and lower compartments, an apertured partition dividing one of said compartments, whereby an amplifier for said machine is formed in said compartment at one side of said partition, and a resonating chamber is formed in said compartment at the opposite side of said partition, one of the walls of said resonating chamber being provided with a sounding board, and the aperture in said partition being substantially centrally disposed relatively to the resonant surface of said sounding board so as to facilitate the projection of sound waves through said aperture, and resonating means within the compartment below said partition wall.

3. In a cabinet for sound reproducing machines, a chamber having a partition wall provided with an aperture and dividing said chamber into upper and lower compartments, a relatively vertically disposed apertured partition dividing said upper compartment whereby an amplifier for said machine is formed in said compartment at one side of said partition and a resonating chamber is formed in said compartment at the opposite side of said partition, one of the walls of said resonating cham-

ber being provided with a sounding board, and the aperture in said partition being substantially centrally disposed relatively to the resonant surface of said sounding board to facilitate the projection of sound waves through the aperture in said partition, a sounding board in the bottom wall of said lower compartment, and the aperture in said partition wall being substantially centrally disposed above the resonant surface of said last mentioned sounding board to facilitate the projection of sound waves through the aperture in said partition wall, whereby sound waves entering the amplifier through the apertures in said partition and partition wall may intermingle more thoroughly with the sound waves in the amplifier.

4. In a cabinet for sound reproducing machines, an amplifier opening out of said cabinet and comprising a frusto-pyramidal shaped structure; a frusto-wedge shaped resonating chamber lying alongside one wall of said amplifier and communicating with the interior of said amplifier through a perforation provided in said wall, the cross sectional dimension varying from back to front of said amplifier in the same degree as the cross sectional dimension taken in the same direction through said resonating chamber varies from front to back, an independently formed resonating chamber lying alongside another wall of said amplifier and communicating with the interior of said amplifier through a perforation formed at an angle to said first mentioned perforation, and sounding boards one within each of said resonating chambers adjacent said apertures.

5. In a cabinet for sound reproducing machines, a rectangular boxlike inclosure having partition walls forming a truncated prismatic amplifier open at the front and closed at the rear and rectangular in cross-section, and also forming a plurality of resonating chambers along the flat sides of said amplifier, each flat side of said amplifier adjacent to a resonating chamber having a sound-perforation midway of its length, and sounding boards within said resonating chambers adjacent said sound perforations.

6. A talking machine comprising an inclosure, including a sounding-board forming an exterior wall thereof, and hollow sound conducting means arranged within said inclosure and having an opening arranged to transmit sound waves toward said board, and an opening arranged to transmit sound waves in a direction substantially parallel to said board.

7. In a talking machine, the combination with a sounding-board, of hollow sound conducting means arranged in proximity to said board but spaced therefrom, and hav-

ing an opening in a longitudinal side of said means facing said board.

8. In a talking machine, the combination with a sounding-board, of tapering hollow sound conducting means arranged in proximity to said board but spaced therefrom, and having an opening in a longitudinal side of said means facing said board.

9. In a talking machine, the combination of a cabinet having a sound chamber with a wall embodying a sounding-board, sound reproducing means mounted on the cabinet outside of said chamber, and an amplifier communicating with said reproducing means and inclosed within and communicating with said chamber and out of contact with and free from said sounding-board.

10. A talking machine comprising a cabinet, including a sounding-board forming part of an exterior wall thereof, and hollow sound conducting means arranged within said cabinet and having an opening facing toward and spaced from said board and an open delivery end.

11. A talking machine comprising a sounding-board, and hollow sound conducting means having an opening facing toward and spaced from said board and an open delivery end.

12. In a talking machine, the combination with a sounding-board, of hollow sound conducting means spaced from said sounding-board and having an opening facing said board and an open delivery end facing in a different direction.

13. A talking machine comprising a cabinet provided with a sounding-board and with an outlet in a wall other than said sounding board, and hollow sound conducting means arranged within said cabinet and having an opening arranged to transmit sound waves toward said board, and an open end arranged to transmit sound waves through said outlet.

14. A talking machine comprising a cabinet provided with a sounding-board, and hollow sound conducting means arranged within said cabinet and having an opening facing toward and spaced from said board, and an open delivery end facing in a different direction.

In witness whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ARMIN BÖRZSÖNY.

Witnesses:

W. G. ALLEN,  
LEONARD DAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



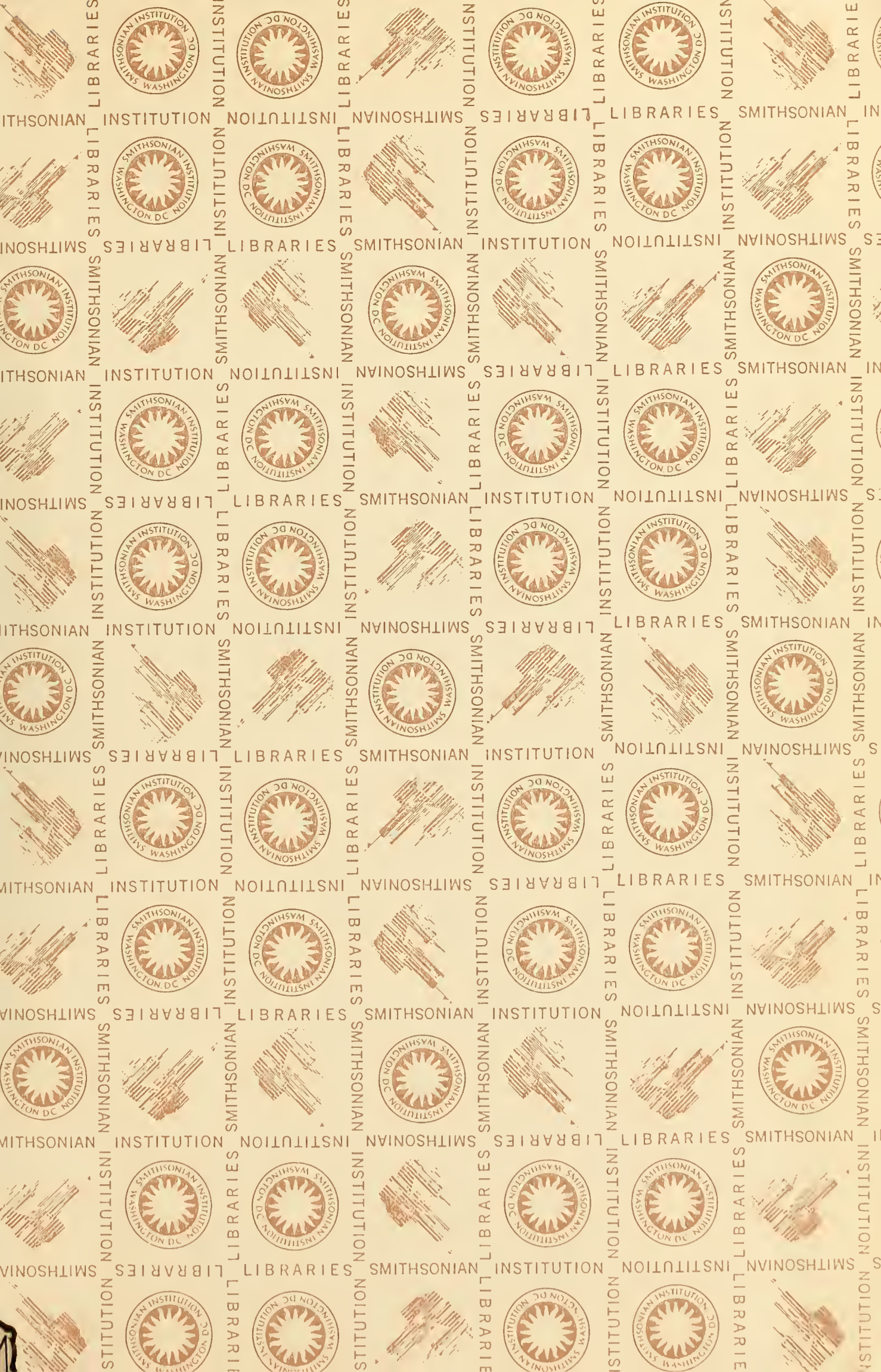














SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00644 5407